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For Sale Everywhere by Newsdealers.

ENTERED AT POST OFFICE, NEW YORK, AS SECOND CLASS MATTER.

New 24-Inch Swing Engine Lathe.

The line engravings on this page represent a new lathe just brought out by S. S. Hepworth & Co., Yonkers, N. Y.

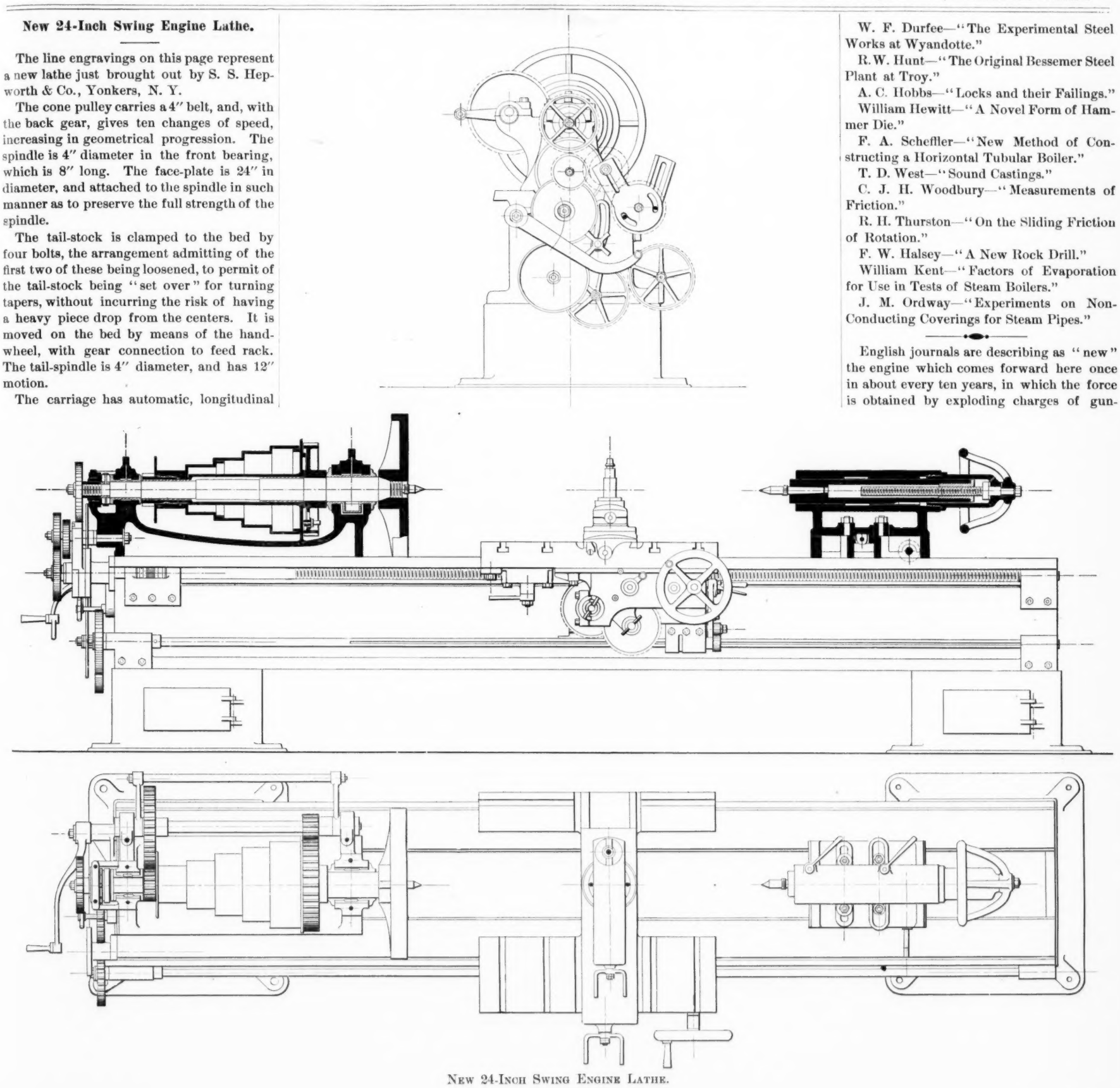
The cone pulley carries a 4″ belt, and, with the back gear, gives ten changes of speed, increasing in geometrical progression. The spindle is 4″ diameter in the front bearing, which is 8″ long. The face-plate is 24″ in diameter, and attached to the spindle in such manner as to preserve the full strength of the spindle.

The tail-stock is clamped to the bed by four bolts, the arrangement admitting of the first two of these being loosened, to permit of the tail-stock being "set over" for turning tapers, without incurring the risk of having a heavy piece drop from the centers. It is moved on the bed by means of the hand-wheel, with gear connection to feed rack. The tail-spindle is 4″ diameter, and has 12″ motion.

The carriage has automatic, longitudinal and transverse feed, which can be regulated to any degree suitable for the work, but only one feed-motion can be connected at any one time. The feed connections will start and stop instantaneously in any position. The reversing motion for the feed is at one end of the carriage, convenient to handle.

The screw-cutting mechanism is entirely independent from the turning feed, and therefore not exposed to undue wear or the getting out of adjustment. Rack and screw are as near the points of greatest cutting strain as practicable, thereby avoiding undue side strains and wear of carriage.

All bearings of spindles and collars of screw are self-oiling, and all parts easy of access for removal and examination.



NEW 24-INCH SWING ENGINE LATHE.

The *Artisan*, of Nashville, Tenn., says: "Writers of fiction are increasing in the South." If anybody has any doubt about an increase of writers of fiction in the North let him try to verify some of the startling campaign stories published every day by the political newspapers. When it comes to writing fiction for the reputation of any part of the country the North will not yield a point in a presidential year.

During the annual meeting of the American Society of Mechanical Engineers, at 12 West 31st street, New York, Wednesday, Thursday, and Friday, November 5, 6, and 7, the following papers, among others, are to be read:

W. F. Durfee—"The Experimental Steel Works at Wyandotte."

R. W. Hunt—"The Original Bessemer Steel Plant at Troy."

A. C. Hobbs—"Locks and their Failings."

William Hewitt—"A Novel Form of Hammer Die."

F. A. Scheffler—"New Method of Constructing a Horizontal Tubular Boiler."

T. D. West—"Sound Castings."

C. J. H. Woodbury—"Measurements of Friction."

R. H. Thurston—"On the Sliding Friction of Rotation."

F. W. Halsey—"A New Rock Drill."

William Kent—"Factors of Evaporation for Use in Tests of Steam Boilers."

J. M. Ordway—"Experiments on Non-Conducting Coverings for Steam Pipes."

English journals are describing as "new" the engine which comes forward here once in about every ten years, in which the force is obtained by exploding charges of gunpowder or gun cotton. Of course it is soon to displace steam.

The *Mechanical World* illustrates a plan for protecting the uptake pipe in small vertical boilers. The pipe is made tapering, and inside this is placed a straight pipe of boiler iron that will fill the uptake pipe below the water line, but will, of course, have a gradually increasing annular space from that point up. This annular space is rammed up with fire-clay.

Heavy and Light Work Skimming Gates.

By Thos. D. West.

Illustrated by Figs. 3, 4 and 6 are plans for skim-gating heavy work. When one has from ten up to thirty tons of iron to pour into a mould, conditions in gating will seldom permit the use of such skimming gates as are generally used for ordinary work. In pouring ten tons of iron through a gate into a mould, there can be no dribbling process allowed. The iron generally requires to be got into the mould as quickly as practicable.

Figs. 3 and 5 represent plans of gates which I have used on heavy work with much success. While they act as skimmers there is nothing to prevent their letting in the iron as fast as if there were one direct gate from the basin to the mould entrance. In Fig. 3 the metal runs down *A*, passing through *B* to *D*. From *D* it goes through *E* to the mould. Fig. 4 is a plan view of this gate. It will be seen that the gate *B* is so placed that it sends the metal in *D* upon a whirl. The inlet gate *E*, being higher than *B*, as shown, admits of a good whirl being generated before the metal rises up to *E*. The inlet gate *E*, if desirable, could be on a level or below *B*. A better whirl would be created by its being above or below *E*, as, when upon a level with *E*, its opening destroys part of the circle, thereby not permitting of as good a whirl being created as if the circle in front of *B* were complete.

In Fig. 5 the metal passes down *H* to *K*, and from *K* to *F*. *K* and *F* are simply one straight gate, the portion between *H* and *R* being as deep again as at *F*, where it runs into the mould. *K* being deeper than *F*, and having the riser *R* at its end, gives a chance for the dirt to be kept up above *F*, thereby allowing, after the start, clean iron to enter the mould. The farther apart the uprights *H* and *R* are, the deep part *K*, of course, being extended also, the better the chances to catch and hold the dirt. This plan is not recommended as being as good as Fig. 3, for it has no whirl, and some dirt may be admitted into the mould especially upon the start.

The gate sizes given are only to present some idea as to their relative proportion; for instance, *D* being 7″ diameter, will admit of the 3½″ diameter gate *A* creating a good whirl, and also gives *D* plenty of room to hold dirt. For practical working the moulder will, of course, have to use his judgment as to the size of the gates in applying them to the conditions to be dealt with. While these gates may be used inside of the flasks, they are more particularly to be used outside, which, for heavy work, is generally the best plan, when practicable, to adopt. Moulders who are accustomed to light work only are, if given heavy work, likely to adopt the methods to which they are accustomed; that is, they think the same kind of a skimming gate will answer all purposes. These often fail, because they will not take the metal fast enough.

In heavy work the metal is generally poured duller than in light work, and when we consider the amount that is run through the gates in not much more time than is taken up in pouring far lighter work, we must admit that to attempt to pour from ten up to and over thirty tons of iron through a form that would insure a light casting coming clean, some evils will be likely to result.

In light work there is a positiveness which it seems almost impracticable to obtain in heavy work. Skimming gates, if properly applied to light work, will assist astonishingly in procuring perfect and clean castings. One reason why heavy castings are not generally benefited by skimming gates, is that the moulds present such a large surface from which dust and dirt can be collected. One thing that should always be remembered, is that a skimming gate only helps while the metal is passing into the mould.

Having at several different times referred to various styles of skimming gates, I will now notice a few of the forms adapted for light work. Fig. 6 is an elevation and plan view of pouring with horn gates attached to a skimming gate, *H*. This bowl, *H*, is formed cone-shaped upon its bottom, so as to give impulse to the whirl upon the start. If at the start a good whirl is formed, it will drive and hold the dirt in the center of *H*, thereby preventing it from entering the outlets which connect with the horn gates. The reason for using the horn gates, is that by their use there is not such a direct current caused as would be were the gate level from *H* to the mould. The less current-influences side gates exert from *H*, the more whirl there will be, which is the success of such a style of skimming gate.

A, *N*, and *G* illustrate the pouring of several pieces from one horn gate, while *T* shows only one piece being poured. The bowl, *H*, is best formed by having a pattern rammed up when making the mould. There might be several sizes of *H* blocks, so that one could use the size best adapted for the piece or pieces to be cast.

Did one wish to further increase the utility of the skimming gate, the whole thing could be formed by pattern, as per sketch Fig. 7. The holes seen at each end are simply for the purpose of holding and guiding the upright gate pins, *P* and *R*, while ramming up the cope. Several different styles of these patterns could be made, either of wood or iron. If of iron, they could be cored out so as to make them light, and not only could they be used for forming the skimming gate in the nowel, but in copes as well. The dotted lines at *B* show where the outlet from *H* should be cut. These outlets could, did one desire, be be made as part of the pattern. As there shown, the whirl will be better preserved. While in Fig. 6 two outlets are shown, cut from *H*, it is not advisable to do so if it can possibly be avoided, for the reason that the whirl in *H* will be greatly lessened thereby. With reference to the proper proportion of such gates, articles previously published, with which most readers are no doubt familiar, give ideas. Any shop that has a line of small work which requires to be finished up, should in some form or other have skimming gate patterns, not only for the purpose of saving labor in cutting the gates, but, as every practical foundryman knows, to leave the cutting of skimming gates to the judgment of many moulders produces a gate which is far from being a cleaner or purifier of metal before it enters the mould.

At Fig. 8 are set forth some more ideas in gating that are useful. The mould shown we will suppose to be a flat plate required to be finished all over. There are two ladles to be used in pouring the mould. The end of one runner nearest pouring gate is formed by a skimming gate cut in cope. At figures 1, 2, 3, 4, 5 and 6 are seen what might be termed blind dirt risers. These are formed in the cope, as will be seen by the joint line *F S*. The lower part of this long runner, from which the inlet gates 7, 8, 9 and 10 are cut, is made in the nowel, and is made the deepest at one end, so as to insure its being kept full. The gates 7, 8, 9 and 10 are supposed to be cut thin, and of an area sufficiently small to insure their taking the metal no faster than the long runner, and gates *P* and *D* will admit of keeping them full while pouring. This long runner might often have the blind risers 1, 2, 3, 4, 5 and 6 omitted. Of course by their use (if the gates *P R* are kept full) there is very little chance for any dirt that might escape from *D* or *R* finding its way into the mould. In cases where there are many castings to make, did one desire to use such a runner having "blind risers," there often might be a pattern made and rammed up with the mould. Also upon the top of these "blind risers" it might in some cases be beneficial to occasionally place risers which would extend up through the cope, as seen at 4, though as a general thing such would be of little practical value. In some cases the air passing up through risers (were it safe to leave them open) may make sufficient current to carry or float some dirt to the riser, but as a general thing the dirt is more liable to stay between or alongside of a riser should it be caught there through the upward rising of the metal.

There are, no doubt, many who cannot see the reason why the gates 7, 8, 9 and 10 could not have been cut nearer to the skimming gate *D*, *R*, *P*, thereby saving the necessity of cutting such a long runner as shown. The reason for cutting such a long runner is simply founded upon the fact, that the longer the distance through which iron is made to travel before it can enter the mould, the better the chances of nothing but clean metal getting into the mould. This long-gate or runner-principle applies towards cleanliness, the same as gating a casting, as far as practical, from the parts required to be finished, which is set forth in the article "Casting Finished Work Horizontally," American Machinist, Nov. 10, 1883.

Often in small work, when a number of small pieces are made in the same flask, should some of them require to be finished they could have no better skimming gates than to let the metal run through the other pieces into them, thus gating from one piece to another; the piece which receives the first iron from the pouring gate will naturally contain the most dirt.

In pouring any casting requiring to be finished, the hotter the metal can practically be poured the cleaner should be the casting. Pieces gated or run from others, especially require to be poured with very fluid iron, not only for procuring cleanliness, but to insure a good full-run casting.

How and where moulds should be gated is often the most essential point to be considered. Of course good skimming gates will not counteract the evils of mould-scabbing, etc., but with intelligence used in gating in concert with a well-made mould, surprisingly clean castings can be made.

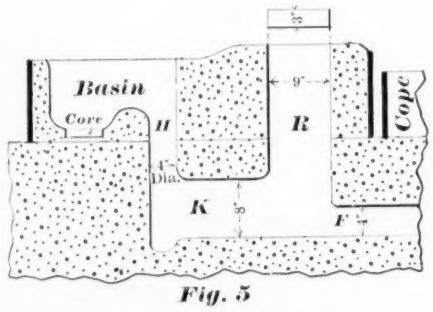


Fig. 5

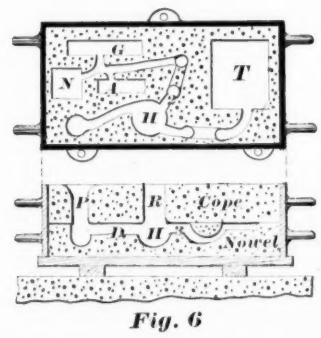


Fig. 6

Fig. 7

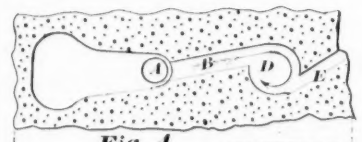


Fig. 4

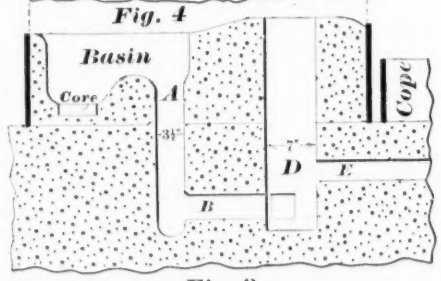


Fig. 3

Heavy Work Skimming Gates.

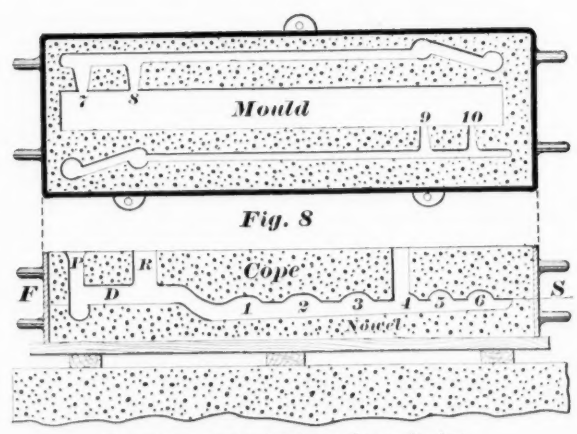
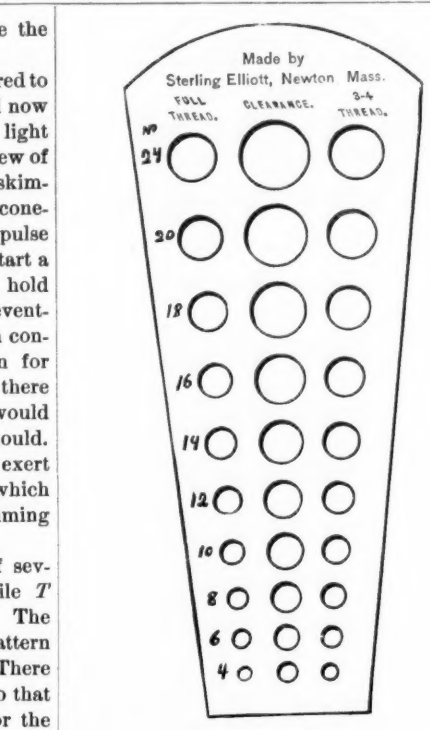


Fig. 8

Small Work Skimming Gates.



Tap Drill Gauge.

A One Dollar Tap-Drill Gauge.

The engraving of this gauge is self-explanatory. It will doubtless be found a very convenient tool for machinists' use, saving time in calipering and selecting drills both for the tap and for the body of the screw, as well as tending towards greater accuracy. We are not informed in what sizes these gauges are manufactured. The one here represented is for the most commonly used machine screws.

The Blacksmith.

The smith has been a mighty man in the world's history. To properly appreciate the valuable services performed to mankind by the blacksmith it is necessary to understand the important part which iron has accomplished in civilizing the world. Without iron or some other metal capable of being made into tools, man could never have risen above the condition occupied by the Red Indians when America was discovered. It was clearly man's destiny to use tools, for without their aid he was more helpless than the lower animals in procuring food. Without artificial weapons man was more defenceless than the beast of the field, for nature had provided him with no natural weapons, and he lacked the fleetness that enables other animals to escape from those that seek their destruction. It was in the way of weapons that metals were first brought into the service of man, and up to the beginning of the last century, nearly all the progress made in metallurgy was in connection with warlike purposes. Steel made a much better ax than a piece of bronze or iron, but it is doubtful if the art of steel-mak-

ing would have been developed had that metal not made a matchless sword. Cast iron makes an excellent engine cylinder, but it is very unlikely that we would be able to-day to cast a mass of iron heavy enough for a cylinder had not the business been improved during centuries in the casting of cannon.

In the boyhood of the world, when war was the leading occupation of man, the smith who could forge and temper a trusty sword was an important personage in camp or castle. We are told that Solomon declared the smith to be king of artisans, because he made the tools for all workmen. Many ancient sayings that reflect the wisdom of the world are attributed to Solomon as a worthy author, and this is probably one of them. In some instances the workers of iron may have received honor in civil life for their skill and knowledge, but it is sad to reflect that instances of the kind were rare, and that it remained for the leaders of war to do the smith full justice. Here his worth was properly estimated. The bards of old thought the mighty war-smith a worthy theme for their lays, and in early days he was often honored as the greatest hero. Homer's description of the labors of Vulcan is a tribute to the smith, elevated to the position of a deity, and though written three thousand years ago applies to the operations of many a blacksmith shop to-day.

"Obscure in smoke, his forges flaming round,
While bathed in sweat from fire to fire he flew,
And puffing loud the roaring bellows blew
Just as the gods direct, now loud now low,
They raise a tempest or they gently blow."

Job, the oldest writer of the Bible, describes the work of the smith in a graphic way, which indicates that the man of patience had often lingered round the smithy door. The importance of the blacksmith's art was so well appreciated by the leaders of strife, in ancient times, that we find them carrying away the smiths as an effectual means of keeping conquered people in subjection. This was done when the Philistines conquered Judea, and when Nebuchadnezzar despoiled Jerusalem, he carried all the smiths captive into Babylon.

The indications are that the smiths of early times kept their craft a secret, and that the knowledge of working all metals was confined to their guild. Their secrets were so closely guarded that they were even prevented from writing down the method of their processes, or of putting the particulars on record in any way that the uninitiated might comprehend. Here the mystic words, signs, and symbols that have become the inheritance of certain secret societies originated and were put to practical use. Some antiquaries have expressed the belief that the gypsies were a race of hereditary metal workers, and that it was in pursuit of this calling that they first spread into the Western world. This is probably an unfounded theory, but it is certain that considerable mystery was associated with the early metal workers.

For many years after Eastern civilization was well advanced, good steel was more precious than gold, and was used only for heroic purposes. In European museums, ancient swords can be seen with only an edge strip of steel, the rest being made of gold. Although the smith's most honored work was connected with arms, his craft did not neglect domestic appliances. They provided bronze and iron implements for the household, the chase, and the farm, and the operations of reducing and purifying the ores were regarded as a part of their trade.

Their metallurgical processes were on a very contracted scale, but they produced excellent metal, some of the ancient steel comparing favorably with our best modern brands. The wootz steel of India, from which a famous sword called the Damascus blade was forged, has seldom been surpassed in quality. It was produced by a most tedious process in pieces of about two pounds each, but the value of the product repaid the great labor of making it.

In the antiquarian museums of Europe there are still preserved many elaborately worked specimens of blacksmith's skill, that are unparalleled as handicraft by any work done in modern times. Coats of mail are to be seen constructed of innumerable welded links which make up a close fitting garment of iron that rivals in exact finish the cloth weaver's art of to-day. Wreaths of delicate flowers, intricately formed scrolls, and elaborate traceries of lattice work produced of wrought iron by forge, hammer and anvil testify to the great perfection in their art attained by Europe's early blacksmiths.

As an ornamental or artistic workman, the smith attained his greatest perfection in the early feudal times, and the social importance of his craft was then at its highest. When William the Conqueror invaded England, the skillful smiths belonging to his army were credited with an important share of the success of the Norman arms, and their value was properly recognized, the chief smith being one of the leading officers of the royal court. When the spoils of conquest were being distributed, the smiths seem to have received their full share of the booty, for many of England's noblemen trace their lineage from Norman blacksmiths; and few of them have such a noble origin were the truth known. Among the Anglo-Saxons, the smith was held in the highest estimation, and his person was protected from violence by special penalties. Besides standing in high favor with the nobility of the olden times, the smith was exceedingly popular with those of lower degree, for he is frequently the hero of the songs and ballads sung by Europe's peasantry. Among the Scotch, the sturdy smith was often the pride of the parish, strength and personal prowess having great attractions for a rude people. Scott makes the gow or smith figure as a hero in the "Fair Maid of Perth." The story is related that the smith belonging to the household of a Highland chief committed a serious crime, and the government demanded that he should suffer the highest penalty of the law. The chief replied that he could not spare the smith but he would let them hang two weavers in his stead. The story fairly represents the value of the respective crafts according to the estimate of feudal times.

Strangely enough the decadence of war in Europe and the growth of commerce diminished the social importance of the artisan and his art deteriorated. A detestable sentiment grew up that made out idleness or what was called the learned professions as the only respectable condition of existence. This is the aristocratic feeling that makes out labor to be humiliating and idleness respectable. There is too much of this feeling in democratic America to-day, as every one can testify who has come in contact with our moneyed classes. But here no great social disease may be apprehended from the idiotic feeling, for children of those who are the snobbiest aristocrats of one generation may yet be the servants of the boy reared in the humblest cottage of the city. Five hundred years ago the social conditions of society were less elastic, and the man who was up remained on the top. Palsied by the aristocratic sentiment which despised labor, the arts which have raised mankind from barbarism to the enjoyment of the comforts of civilization ceased to progress.

Masonry, which had reared the awe-inspiring cathedrals, majestic castles, and indestructible bridges, all over Europe, degenerated in some of the most advanced countries, till in the beginning of the eighteenth century architecture was dead, and the art of bridge building was forgotten. Bridges built during one season in Britain were generally carried away by the floods of the succeeding winter, and parties wishing to erect a fine church or residence had to search Italy or the Netherlands for an architect. Metallurgy languished for five hundred years, and the smith's craft degenerated from that of a scientific artist to the condition of a rough forger and welder. It remained for the impetus to human progress given by the application of steam as a motive power to raise the artisan from the condition of semi-slavery into which he had descended.—*Lecture on Pioneer American Mechanics, by Angus Sinclair.*

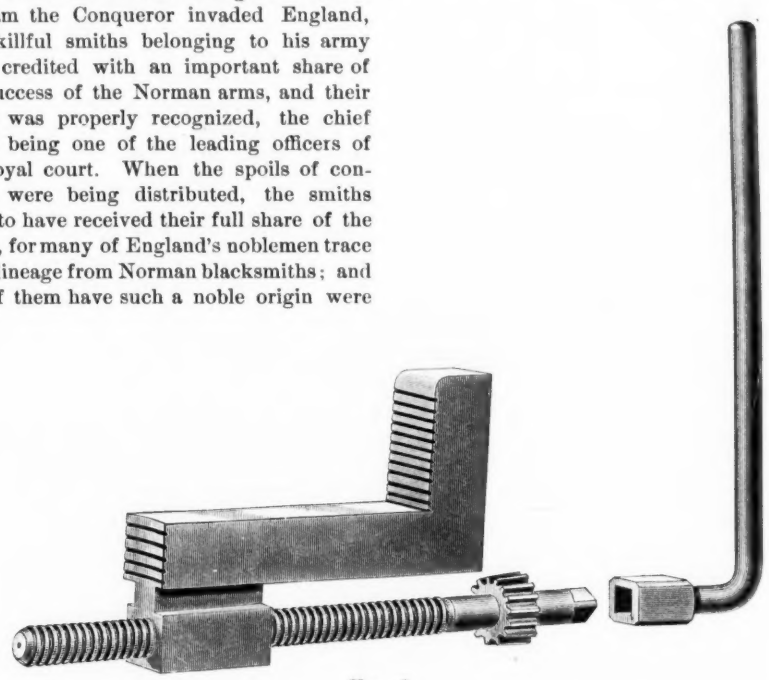


Fig. 2.

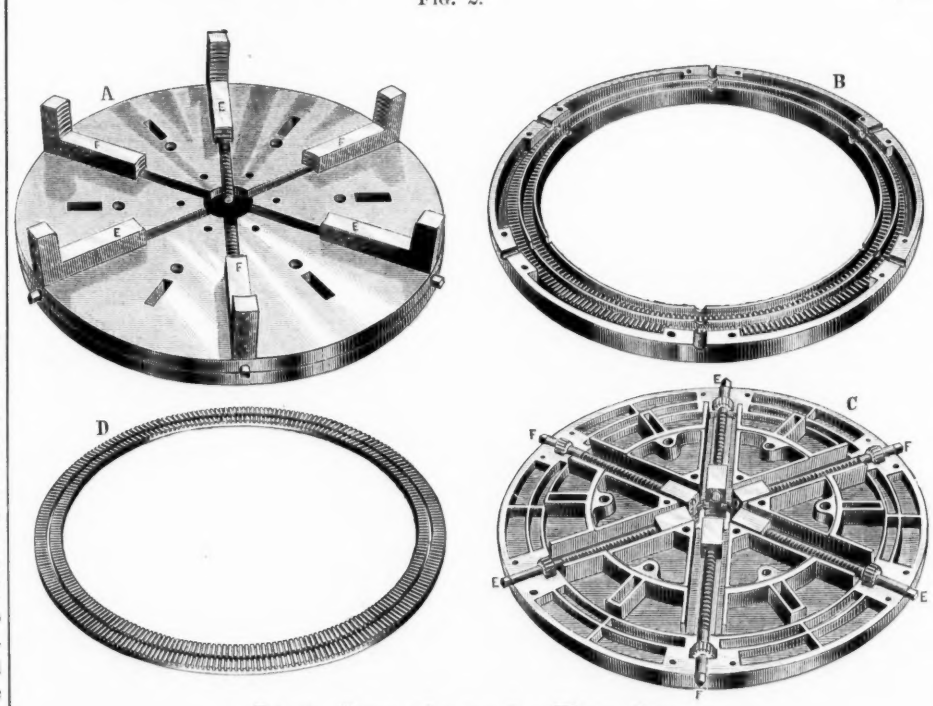


Fig. 1.—Double-Geared Car Wheel Chuck.

Double-Geared Car Wheel Chuck.

The engravings presented with this represent a new chuck for which patents are pending to the E. Horton & Son Co., Windsor Locks, Conn. While the construction of this chuck embodies the general principles of the other chucks made by this firm, it will be seen that this one has six jaws arranged on their universal principle in sets of three each, each set operated by a separate gear and driving screws.

The construction and operation of this chuck will be comprehended from an examination of the engravings. In these *A* represents the face of the chuck, and *B* the back plate, or ring, with the two gears situated in the deep recess. When the parts of the chuck are bolted together, they form a tight casing for the gearing, inside of which it is secure from dirt, chips, etc., which would interfere with its operation.

At *C* is shown a view of the back of the chuck with the back plate removed, exposing the pinions, driving screws, seat for lathe face-plate and nuts of jaws through which the driving screws pass. At *D* is shown the double gearing for working the chuck.

Jaws *E*, *E*, *E*, in *A*, are operated by the correspondingly lettered screws in cut *C*, through the inside rack or gear shown in *D*. It will be understood that these three jaws constitute by themselves an entire set of self-centering universal jaws.

Similarly, the jaws *F*, *F*, *F*, in *A*, are operated by the screws *F*, *F*, *F*, in *C*, through the outside gear, in *D*, and also form a set of self-centering jaws. Both sets of jaws described work to a common center.

It will be apparent that by this arrangement the gripping strength of two separate chucks is combined in one. It is also obvious that this is an advantage, not only so far as securely holding the work is concerned, but that the six points at which the wheel is gripped will better compensate irregularities of surface; in other words, the wheel will be centered more perfectly from six points on its surface than from three.

The face of the jaws are true with the face of chuck, and the bite is ground at an angle of 3° (as shown in Fig. 2), so as to correspond with the taper of the tread of the wheel; thus, as the jaws are tightened, operating to true the wheel in all directions.

For moderately light work it will not be necessary to use but one set of these jaws, unless it is desirable to center the work with great accuracy.

When required, this chuck is constructed so as to have the six jaws operated at once, the inside set of gearing being dispensed with; or one set can be used independent and the other universal, both sets independent, or both sets either universal or independent.

The body of the chuck is made of special strong cast-iron, the jaws of solid wrought iron, case-hardened, and the screws, racks and pinions of steel. It will hold wheels from forty-two inches down to twenty inches diameter on the car wheel or outer bites; the inner ends can be used for holding ordinary work from twenty-five down to four and one-half inches diameter, or, if only one set of jaws are used, down to three inches.

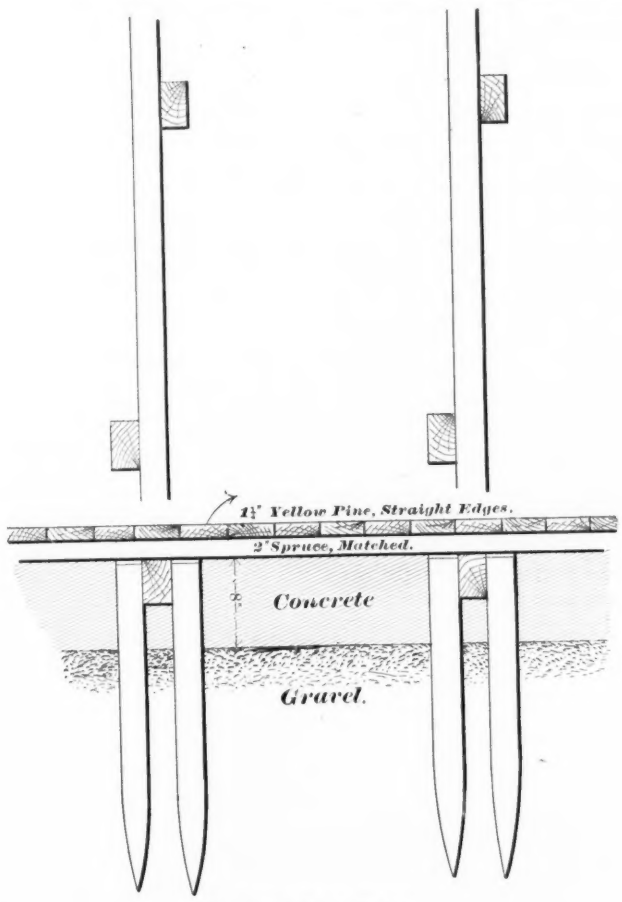
Joseph M. Wade has retired from his position as editor of the Boston *Journal of Commerce*, and has accepted a position as editor of the textile department of the *Dry Goods Bulletin*, of New York City.

Thomas Pray, Jr., editor of the *Manufacturers' Gazette*, of Boston, has moved his editorial and general business office to 319 Broadway (Rooms 3 and 4), New York. Mr. Pray is one of the most indefatigable newspaper men in the country. He would succeed where most others would fail. In a few months he has built up the *Gazette* to a much larger circulation than it ever had before, and has made it a valuable and interesting journal for cotton spinners, steam users, and others engaged in textile manufacturing interests.

Machine Shop Floors.

Since an inquiry as to the best ground floor for a machine shop appeared in our columns, we have received and published several communications on the subject. For the following sketch and specification in explanation, we are indebted to the Yale & Towne Manufacturing Company, of Stamford, Conn. The specifications, so far as they relate to the subject are as follows:

That the whole interior of the crane shop shall be floored in the manner indicated on the detail drawings; that preparatory to this, all soil or loam shall be removed from the interior of the building, and its whole surface graded to a proper level with clean gravel, stone or ashes, which shall be puddled, rolled or otherwise packed until thoroughly hard and solid; that a series of $2\frac{1}{2} \times 4$ inch stakes shall be driven into this gravel in regular lines, as per detail drawing, each stake to be driven down to a solid bed, or not less than 30 inches, and that nailing strips, fitted and well nailed to these stakes, shall then be laid and carefully leveled to the proper height so as to insure the proper support and perfect leveling of the whole floor; that on top of the gravel bed, and between and under these nailing strips, there shall be laid a course of concrete, not less than 8 inches thick, consisting of clean cobbles, averaging about 2 inches in diameter, well coated with coal tar or bitumen, and laid in place while the latter is soft, and then solidified and packed together by being rolled and tamped; the upper surface of the concrete course to consist of a thin covering of tarred sand or fine gravel, filling the interstices of the cobbles and thus forming a smooth, hard surface, flush with the top of the nailing strips; that on top of this shall be laid the first course of wood, consisting of two-inch planks, not exceeding 7 inches in width, tongued and grooved together, or grooved on both edges and fitted with hard pine splines measuring $\frac{5}{8} \times 1\frac{1}{4}$ inches, these planks to be mill-worked to uniform thickness, and laid with the surfaced side up, each plank to be fastened with two forty-penny nails at each intersection with the nailing strips, and all butts to be made on a nailing strip; that on top of this floor the contractor shall lay a course of building paper (the paper to be furnished by the company) and over this a course of yellow or hard pine flooring, $1\frac{1}{4}$ inches thick, the strips not to exceed four inches in width, and to have standing or straight edges (without tongue and groove) and to be mill-worked to uniform thickness, the surfaced side laid up, each strip to be fastened to the under floor, by two ten penny finishing nails in each 16 inches of length, these nails to be well set, so to stand at least one-quarter inch below surface of floor; the floor to be carefully fitted and well secured around all piers, and against all walls. Opening to be left in this floor around foundations for heavy machines as the company may direct, an abatement of —— cents per square foot to be allowed by the contractor to the company for the floor surface thus exempted from covering.



MACHINE SHOP FLOOR.

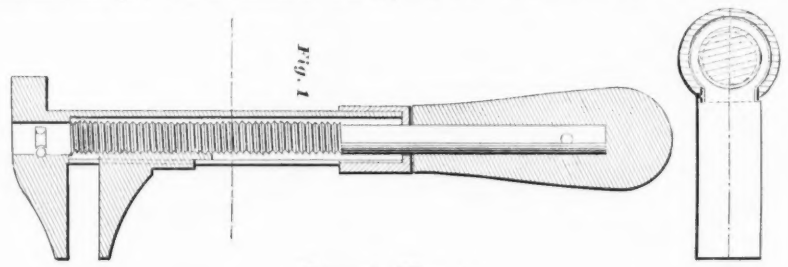
Expiring Wrench Patents.

BY F. R. BROCK, WASHINGTON, D. C.

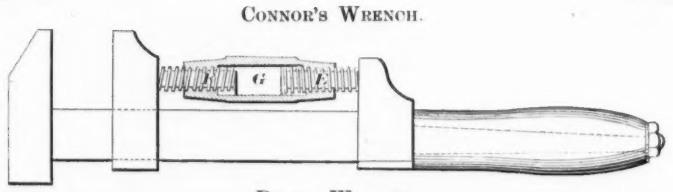
The four designs which are here presented will be treated in the chronological order of their invention, brief descriptions and comments being given of each. It may be remarked, however, in the first place, that the patents of all of these which have expired, and the devices shown by them, are public property.

John C. Connor's patent consists in attaching to or forming with the heel of the stationary jaw of the wrench (see Connor's drawings), and projecting at right angles from its inner face, a hollow cylindrical tube or shaft having a slot extending the whole of its length, in which slides, and is guided thereby, the heel of the movable jaw, which heel is made of a tubular shape, fitting within the hollow shaft of the stationary jaw. The movable jaw receives the concentric screw shaft of the hollow tube, and is so secured at one end to the stationary jaw as to loosely turn therein without disconnecting. At the other end of the screw shaft the handle of the wrench is fixed, so that by turning the handle to the right or left the movable jaw will be made to travel toward or from the stationary jaw, as the case may be. It is claimed that this method of securing any desired adjustment of the wrench imparts rigidity and steadiness to the movable jaw, as it is manipulated.

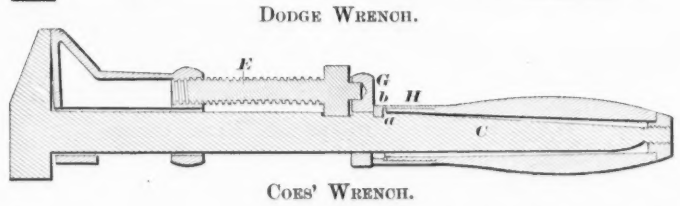
Perhaps the most popular form of wrench at present in use is that known as the



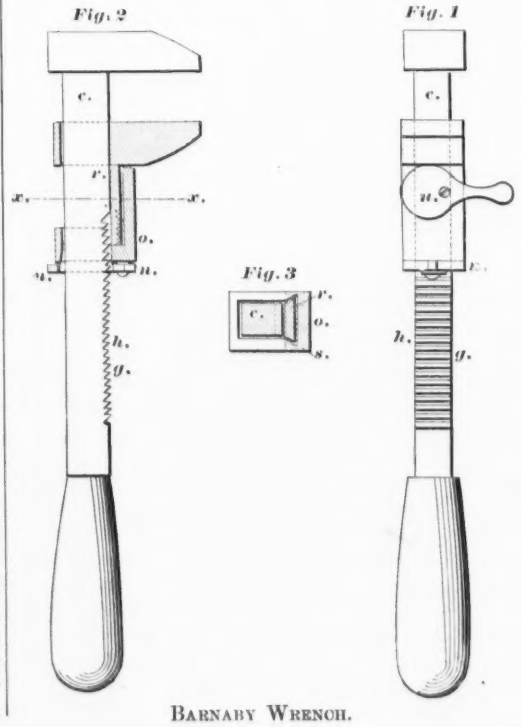
CONNOR'S WRENCH.



DODGE WRENCH.



COES' WRENCH.



BARNABY WRENCH.

"Coes'" wrench. Coes' patent has expired, and there has also expired recently a patent by Coes for an improvement of his original wrench. As the latest patent of A. G. Coes shows both the original construction and the improvement, we will describe only the later patents.

Coes found in the practical use of his original wrench that his method of sustaining the screw of the movable jaw, or its step in proper position against the pressure brought upon it, was not safe and reliable. This pressure upon the movable jaw, and its screw and stop, often drove the stop and its support back against the handle, either fracturing or forcing it from its hold upon the shank of the stationary jaw.

To remedy the above evil Coes formed an unyielding metallic connection between the bearing of the movable jaw screw and the stationary jaw bar, by means of a notch and lip to guard against oblique or longitudinal misplacement. A clear idea of the improvement is had by reference to the engraving.

The bearing of the inner end of screw *E* is formed in a block *G*, encompassing and fitting tightly the shank *C*. To secure the block so as to withstand the pressure of the screw when in use a notch *a* is cut in the upper side of the shank. Into this takes a ferrule *H*, abutting closely against the block, and having an inwardly projecting annular lip *b*, the opening through the ferrule being eccentric, with respect to the end of the ferrule, in order that when the latter is finally fixed in position about the shank *C* concentrically, the lip will extend tightly into the groove or notch *a* of the shank.

We do not wish to be understood as saying that all the Coes patents have expired. There are several, embodying specific improvements upon nut wrenches, which are still in force.

Mr. Dodge says the sliding jaw of his wrench (see figure of Dodge wrench), may be "operated much more expeditiously than in the wrenches heretofore in use, and without detracting in the least from the rigidity with which the jaw is held in place, or from the strength of the several parts of the wrench. Dodge's patent expired in 1883.

G represents a tubular nut in the ends of which are formed respectively right and left-hand internal thread. One of the threads takes into screw *E*, and the other is fitted upon screw *F*, in such manner that by turning the nut *G* in one direction it will advance the jaws, and in the other direction will recede the jaws of the wrench. Thus, in one revolution of the nut, the sliding jaw is brought away from the fixed jaw a distance equal to the aggregate of the pitch of the two screws *E F*, or, in other words, a distance twice as great as would be the case if but one such were employed to operate the jaws.

The device of S. S. Barnaby, which expired last April, arranges the movable jaw so that it can be readily adjusted and set at any desired position upon the connecting bar or shaft by means of a pawl and eccentric.

By referring to Barnaby's construction, it will be seen that the edge *g* of bar *c* has a series of teeth *h*. The movable jaw slides loosely upon the bar so as to be freely moved forward or backward. It is held securely in any position by means of a sliding pawl *n* on the inner end of the sleeve *o*, interlocking with the teeth of the bar, and from which it is disengaged by simply raising the same.

In case it is necessary to set the movable jaw to an adjustment less than the space between the teeth of the bar, an arm *r* moves in a groove *s* formed in the sleeve *o*, so that by turning the eccentric or cam lever *u* in the proper direction to bear against the inner end of the jaw it traverses the requisite distance, it being held there by the cam until released, when the jaw is forced back to its original position by means of a spiral spring.

Chicago Ice-Making Machinery.

A visitor to this office some time ago, and recently returned from Jamaica, spoke very favorably about American ice-making machinery he had seen in use on the island. He believed that the ice-making business could be greatly developed in Jamaica, as the demand for artificial means of cooling was great, and the supply was so limited that ice cost more than bread. During a recent ramble around machine shops in Chicago, we recognized the ice-making machine described by our Jamaica visitor in the shops of Fraser & Chalmers, Fulton and Union streets. From the firm we learned that they have a constant demand for this class of machinery for the tropical islands, and also for different sections of the Southern States, Texas manifesting a growing demand for this aid to health and comfort. The machine made by Fraser & Chalmers can be used either with air or with ammoniacal gas, and its construction is very simple, considering the complex operations it is required to perform.

In addition to refrigerating machinery,

this shop has very heavy work of different kinds on hand. They have a most ponderous plant of Cornish mining machinery partly finished, besides several heavy ore-crushers, concentrating ore machines and pumps. The greater part of the machinery turned out here is driven by a Corliss engine made by the company. In connection with the making of this engine, we observed a special attachment connected with a boring mill, where the cylinder is secured on a frame during the boring operation. Work held in this frame can be moved only in line with or at right angles to the axis of the boring bar—an arrangement which preserves the valve seats accurately parallel with the bore of the main cylinder.

Powell's Iron Lathe Gear.

The object of this device is to provide a more convenient means of changing the revolution of the screw or feed apparatus of an engine lathe for screw cutting or for turning, doing away with the ordinary detached gearing commonly used for this purpose. As will be inferred, it consists of a series of wheels suitably mounted and arranged to be applied to any engine lathe, fitting to the old arm and taking the place of the old arrangement of gearing. When so attached it enables the operator, by the movement of a lever, to instantly gear the lathe for cutting any desired pitch, or to change the feed as quickly through any gradations from finest to coarsest. There are no gears to change or combinations to be made, nor is it necessary to stop the lathe for making required changes of feed or pitches to be cut.

In the construction the parts are made strong, and the motion of the parts is kept as low as possible so as to avoid the wear of high speed and preserve the whole in good condition as long as other parts of the lathe will last. The wheels subjected to the most wear are made of steel, and best composition bearings are provided throughout.

The application of this device to any ordinary engine lathe is a very simple matter. The manufacturer is B. B. Powell, Petoskey, Michigan.

LETTERS FROM PRACTICAL MEN.

To Disconnect a Locomotive with Broken Valve Yoke.

Editor American Machinist:

In your most valuable paper of October 25, I see a piece headed "Examination for Locomotive Engineers," which is of great value to engineers and firemen. I wish to call your attention to one question, where I think there is a better way by which much time will be saved. The question is: "After locating the broken yoke, how would you disconnect?" The answer given in AMERICAN MACHINIST is: "Would take off steam-chest lid, place the valve on center," etc. I don't agree with you there, as breaking the joint takes some time. I had the same thing happen me October 8. I disconnected main connection, shoved piston as far forward as it would go, blocked my guides, disconnected valve stem, shoved valve as far forward as possible, and secured it. Time it took to do it, 19 minutes, where it would have taken me at least one hour the other way.

I don't think there is any need of taking off steam-chest cover. Am I right?

I read your valuable paper very closely, and find it one of the best papers of the kind printed. I have taken them all since I first saw a copy, and am sorry I did not find it before. L. S. S.

St. Stephens, N. B.

[The examination papers our correspondent refers to were not prepared by us, but at the mechanical headquarters of one of our prominent railroads, where they are used, and that company have, of course, the right to require their men to do the work necessary to run disabled locomotives in the way they think best. But we think the plan followed by our correspondent in the case of a broken valve yoke is the better and prompter way, and equally as safe.]

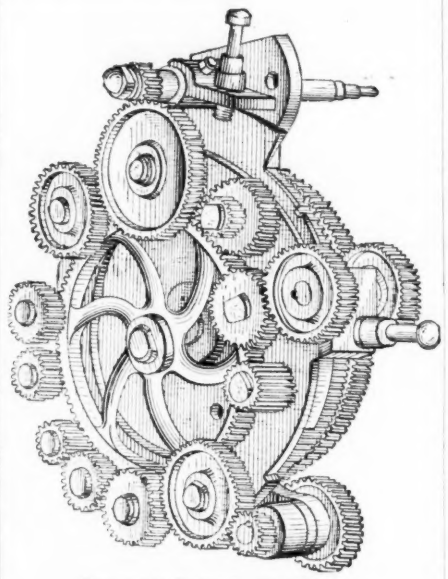
Catechu or Gambier.

Editor American Machinist:

I noticed in the AMERICAN MACHINIST of last week an article by "C. R. C." about a substance called "japonica" or "catechu," for loosening scale in boilers. His description seems to correspond with that of a substance which I have been using called "gambier." The color and consistency is the same, and it comes in the same way he describes, and I think from the same place. It seems to act very well in my boiler, and I would like to know if it is the same substance with a different name.

SAM'L T. WILLIAMS.

[Gambier, catechu, and terra japonica are substantially the same.]



POWELL'S IRON LATHE GEAR.

A Question.

Editor American Machinist:

I have a problem for my brother engineers, and would like to have some of them solve it if they will.

In the cuts, a Corliss cross-head, piston rod, and part of the shackle-bar are represented. We will suppose that the piston is traveling in the direction of the arrow, crank down, engine taking steam at crank end. The pin *n*, Fig. 2, is set diagonally in the head instead of straight, while the boxes *b*, Fig. 1, are bored straight. What would be the noticeable effect on the piston-rod when the engine takes steam at the crank end of the cylinder?

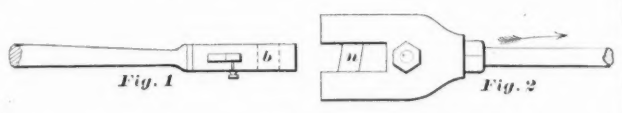


Fig. 1 *Fig. 2*

Would the rod retain its position, or spring, and if so, which way?

Why would not the box wear to the pin and then work all right, both box and pin being on the same angle? E. E. BIGELOW.

Locomotive Fuel Economy.

Editor American Machinist:

In a recent number you described the operation of an American locomotive which was run on a coal consumption of 37.32 lbs. to the mile while pulling eight cars at a speed of 36 miles an hour, and the remark is made that this is the best authentic result yet attained in locomotive fuel consumption in this country. The record referred to is surpassed by the performance of the "H. A. Whitney" No. 4, on the Boston and Providence Railroad, with about the same average load and speed. In running 1,702 miles the gross amount of coal consumed was 26.78 tons, which gives 63.56 miles to the ton of coal, and divided up is 35.24 pounds to each train mile.

The locomotive that did this work was a Mason engine built at Taunton, Mass., from the designs of Mr. John T. Meats, Superintendent of the Mason Machine and Locomotive Works. The engine has cylinders 18x24; the drivers are 68 inches diameter. The figures given are not selected specially to favor the engine, but are from the official statement, and show the coal needed day in and day out for making regular round trips of 88 miles, and included the fuel for steam raising, cleaning the fire and banking the same. The starting points are both at tide-water, and during each trip the engine had to ascend a hill 250 feet above sea level, the average load being eight and nine cars.

M. M.

Spiral Attachments for Milling Machines.

Editor American Machinist:

The article by Mr. Simonds, in your issue of October 18, 1884, I consider misleading, inasmuch as the inference is therein drawn that all separate spiral attachments are made with a round base, and are not automatic in feed.

Now, those familiar with the productions of the Brainard Milling Machine Company, of Hyde Park, know that they make a spiral attachment for their milling machines which has a large, flat base, has automatic feed, and supports the outside end of conical as well as straight blanks.

Moreover, one of the very features of the device which Mr. Simonds condemns, viz., the non-support of the ends, is a prominent point in the machine itself made by the well-known firm to whom he calls attention; and, as most mechanics will agree that a sliding table should be supported by a carriage nearly or quite its length—at least that would be considered the best construction—then is it not better to have a weak point in a device used but occasionally than to embody that fault in the parent machine? This was one of the reasons which led the Brainard Milling Machine Company to adopt a form of supporting knee carriage and table which they believe is equal to any in the market.

A word as to convenience. Mr. Simonds says a vise may be placed between centers; very true, but he presupposes that all the work to be placed therein is short. The reception of a shaft to be splined—or, in fact, any job which the centers would not receive—would hardly be benefited by their presence.

A platen, T-slotted in both directions, free from incumbrances of every kind, is surely the best adapted to receive the variety of fixtures usually placed on a milling machine table. J. F. ROSS.

Hyde Park, Mass.

"The Safety Element."

Editor American Machinist:

I have read with pleasure and profit the article by Mr. J. W. See, in your issue of November 1, on "The Safety Element," and you will pardon my calling attention to a slight misapprehension of terms occurring in one paragraph.

When the strength of the rope exactly equals the weight sustained, the factor of safety equals unity and equilibrium still exists.

When the strength of the rope falls below the amount of tension, the factor of safety becomes a proper fraction, and rupture commences. As the forces of cohesion are gradually overcome, and the molecules of the hemp or metal, as the case may be, are drawn farther and farther apart, the strength of the rope becomes less and less. The fraction representing the factor of safety decreases correspondingly in value, for its denominator is the tension exerted by the weight and its numerator is the tensile strength of the rope at any instant. When the rope parts its tensile strength becomes equal to zero, and therefore the factor of safety becomes equal to zero, *but it can never be less than zero.*

This obvious fact is evidently lost sight of in the paragraph from which the following quotations are taken: "Hence we can see that our factor of safety of five will be reduced infinitely below zero at some future time * * * *

* * * "If one of the two ropes had a factor of safety of five, and the other rope breaks before wear and tear have reduced the factor of the first rope to zero. [Evidently meaning unity.]

* * * "If it defer this breaking until the factor of safety of the rope on which we must depend has fallen below zero."

My excuse for criticising is that the article is too clear and interesting an exposition of the matter to allow this single flaw to remain unnoticed. A. P. SMITH.

The system of originating and carrying on all the departments of the business of locomotive building is arranged in a most systematic manner in the Pittsburgh Locomotive Works. All work originates from the drawing office, and nothing is made in any of the shops without a drawing being sent to furnish the necessary particulars. When one or a group of locomotives is ordered, the superintendent gives notice to the chief draftsman, intimating the class of the engines and the time they are wanted. It is then the chief draftman's duty to forward to the various foremen orders to get the parts made that belong to each shop, and to supply the necessary drawing. For standard engines printed orders are kept on hand, and the draftsman fills out the number of pieces wanted, and refers the foreman to the drawing, duly lettered and numbered, which furnishes particulars as to sizes. The plan works very smoothly, and engines are often ready for lettering before any one in the works under the superintendent knows where they are going.

A well-known Scotchman, who carries on a business of selling machinery in a western city, is famous for the pleasant style in which he sympathizes with the taste of his customers. The story is told of this dealer that a gentleman entered his place one day and said he wanted to purchase a bell, telling about the dimensions required. "I have something that will just suit you," said the dealer. "Here is a bell with a sweet dulcet tone, that will call with reverend voice on Sabbath morn for worshipers to come to the house of God."

"I don't care anything about that," said the visitor, who had a somewhat deaconly aspect. "I want the bell for a fire alarm."

"It is just the thing for that purpose," asserted the dealer. "Its call is so sharp that it will make the boys run like—hades!"

American Institute Fair.

The American Institute Fair in this city is very much like it has been in former years. The chief exhibits are furniture and household articles. One of the most noticeable exhibits in the machinery department is that of E. Gould & Eberhardt, Newark, N. J. It consists of shapers of 10″, 15″, and 20″ stroke, a 16″ lathe, a square spindle drill press, universal automatic gear cutter, and a quick-stopping hand lathe. All the tools are in operation, and an attendant is always ready to answer questions about them. E. E. Garvin & Co., of this city, also have a fine exhibit of machine tools, milling cutters and milling machine attachments. The most complete variety of steam appliances is shown by A. Aller, 109 Liberty Street, New York. They embrace the whole line of Korting steam jet apparatus. The Albany Steam Trap Company show one of their special bucket-return steam traps, also a gravitating return steam trap. In a case they have a line of Blessing's removable seat globe and check valves, recently illustrated in the AMERICAN MACHINIST. Brown & Sharpe standard gears are shown by H. T. Patterson & Co., of New York. They range from the smallest to quite large sizes. The Blevney Mfg. Co., Newark, N. J., exhibit their friction clutches and pulley. Among special tools Watson & Stillman, of New York, have a full exhibit of hydraulic jacks and punches. Among the noticeable novelties is the Little Giant tool grinder, which runs a 10″ corundum wheel in water. The exhibitor is L. Best, Jr., 36 John St., New York. Another novelty is the Hazelton boiler, which consists of a large vertical center tube into which are screwed tubes or arms, each having a welded head at the outer end.

Plan of Railroad Libraries.

In our issue of July 19th, this year, we published a letter from Wm. Fraser Smith, division master mechanic of the Central Pacific Railroad, giving some particulars about the Railroad Employes' Library Association at Carlin, Nevada. That library has been a great success, and it has been kept up by employes alone. We promised to publish in a future issue some of the most essential provisions of the constitution and by-laws of that library association. Extracts will be found below. Libraries on this plan should be founded by the employes of every large railroad.

EXTRACTS FROM THE CONSTITUTION.

The designs and objects of this association are to cultivate a social feeling of friendship and the mutual improvement of its members; the dissemination of information and useful knowledge by the establishment of a library, a museum and reading room; the collection of a cabinet and works of art; the encouragement of lectures and poetry; the toleration of those games of recreation which everywhere enliven the heart and restore the overworked brain to ease and peacefulness, and to purchase property and erect buildings for the requirements of the association.

No shares of stock, nor any individual right in the property of this association, shall exist or be acquired during the existence of the association; but the property belonging to and in the name of "The Carlin Library Association" shall be held in trust by the directors for this association, and never be diverted from the purpose and intention for which it is organized.

The affairs of the association shall be administered by a president, vice-president, secretary, treasurer, and a board of five directors.

Any person of good character may become a member of this association, subject to the approval of the Board of Directors—first, by signing the constitution and by-laws; second, by paying one dollar and fifty cents dues quarterly in advance, but any person not being an employe of the Central Pacific Railroad Company shall not be eligible for office, nor have any vote or voice in the election of officers, nor in the management of the business of the association.

Any non-resident person of good character, and not objectionable to the Board of Directors, can have the use of the rooms of the association on the prepayment of fifty cents per month.

Failure to pay dues for the space of three months shall be a forfeiture of membership.

If any member shall wantonly create a disturbance at any meeting of the association, or devise or take part in any measure designedly to injure the association, or shall purposely deface the books, building, rooms, or appurtenances thereof, he may be expelled and deprived of membership by the vote of those present at any meeting of the Board of Directors, subject to an appeal to the association.

EXTRACTS FROM BY-LAWS.

The Committee on Library, Newspapers and Lectures shall have supervision of the books, periodicals, newspapers and lectures of the association, see that the books and papers are properly arranged and kept in good order, and make arrangements for lectures on popular and instructive subjects, and invite lecturers to deliver the same.

It shall be the duty of the Committee on Cabinet and Donations to make suitable arrangements for the collection of a cabinet, and to solicit and accept donations of books, papers, magazines, pictures, paintings and works of art, and all other articles suitable for the association.

The library shall be open every day throughout the year from seven o'clock A. M. until ten o'clock P. M., excepting Saturday evenings, when it shall be closed at half-past ten o'clock.

If any member lose or injure a book, he shall make the same good to the association.

No member shall be permitted to indulge in any loud or boisterous noise to the discomfort of any other member in the rooms of the association.

No children under the age of twelve years, unless accompanied by their parents or guardians, will be allowed in the rooms of the association on any occasion whatever.

In a recent polytechnic discussion at the rooms of the American Institute on the use of petroleum applied as a coating to the inside of boilers, to prevent the formation of scale, it was suggested that a good way to apply it to boilers, having many tubes, would be to fill them with petroleum, then draw it off, which would leave all inside surfaces thoroughly well coated.

In the discussion of a paper on "Fire-Clays and Fire-Bricks" at the Chicago meeting of Mining Engineers, Mr. W. S. Durfee said:

"In connection with this subject, I will describe the construction of the roof of a reverberatory furnace, which I erected some ten years since. The roof was made of composition crushed fire-brick mixed with very little fire-clay. These two substances were intimately mixed dry, and then the whole was wetted with a saturated solution of common salt. This mass was then rammed one foot in thickness upon a rudely formed wooden center in the furnace. It was then allowed to stand a day or two to dry in the air. Then the gas was turned on in the furnace, and a low heat kept for a number of days until the moisture was expelled from the roof. Of course, the center was burned out immediately. Then a more intense heat was applied, and finally the whole interior surface of the roof was baked into one entire fire-brick mass, so to speak. That furnace was used under my supervision for over a year, in some cases with a temperature as high as that of the welding heat of iron, and the roof was a great success in every way. I have no doubt that, when it is possible to give time enough for a furnace roof to dry before it is burned, the plan I have described will be found much more satisfactory than the ordinary construction composed of small pieces or masses of fire-brick."

In a paper read at the Chicago meeting of the Mining Engineers on the "Blake System of Fine Crushing," we find this paragraph, which contains a good deal of truth, as well as a hint that may be applied to other mechanical operations:

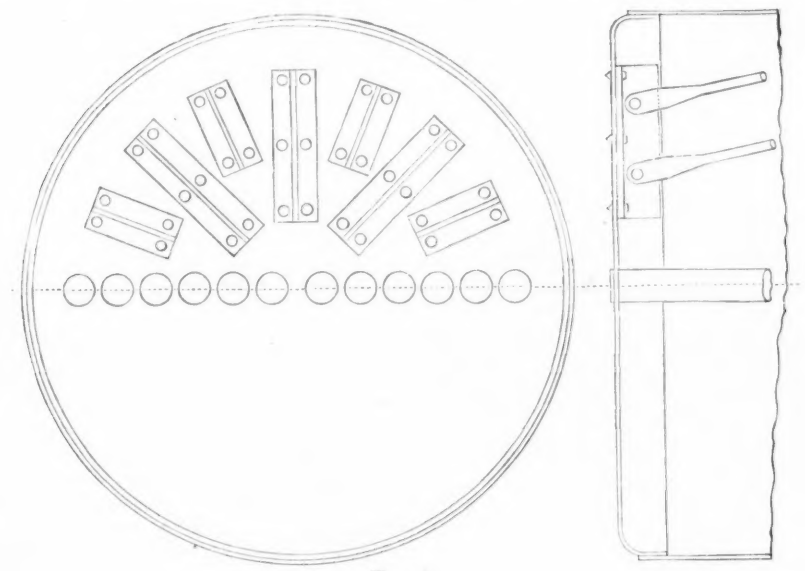


FIG. 1.

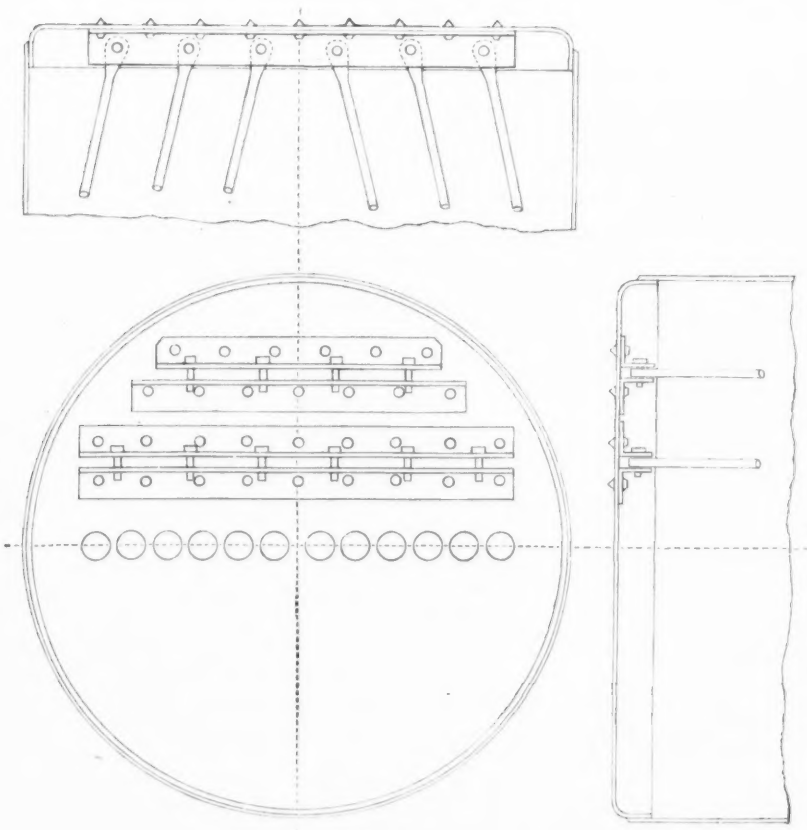


FIG. 2.

"If we seek for the reason of the success of the Blake crusher, aside from its simplicity of construction, we shall find it in the adherence to the principle of crushing by *simple pressure* and careful avoidance of attrition. In this lies the economy of power and of wearing surfaces."

Personal.

John J. Grant, formerly of the firm of Grant & Bogert, has severed all connection with Mr. Bogert, and will start in machine tool manufacture in the vicinity of New York. Mr. Grant has had an extended experience in the business, and is a mechanic of well-known and recognized ability, having designed and built a large variety of tools that have been highly commended for their excellent qualities. He has an extended acquaintance amongst mechanics and manufacturers in all parts of the country, and many warm personal friends who, with us, will wish him success in his new enterprise wherever he may locate.

Methods of Bracing Boiler Heads.

FROM "THE LOCOMOTIVE," PUBLISHED BY THE HARTFORD BOILER INSURANCE CO.

The accompanying illustrations show the methods of bracing the heads of horizontal tubular boilers most commonly practiced in this section of the country. Let us briefly examine and compare them.

Fig. 1 shows the style of bracing recommended by this company in their specifications where ⊥ or L iron is used to attach the brace to. We recommend the ⊥ iron, as shown, in preference to L iron. The pieces should be riveted to the head above the tubes (of which only the upper row is shown in the cut) in a radial position. By making this disposition of them we are enabled to use a straight brace, and the resulting pull on the brace is more direct than it would be with the brace in any other position. The ⊥ irons should be of the best quality obtainable, 4x4x$\frac{1}{2}$ inches. The rivet-holes in their flanges, both for the attachment of the ⊥ iron to the head and for the attachment of the brace to the ⊥ iron, as well, also, as those in the boiler-head, should all be drilled, not punched. This makes a much better job.

Fig. 3 (page 7) is aview of the form of brace recommended for use with the foregoing arrangement of ⊥ irons, to a larger scale than Fig. 1. These braces should be made of the very best round iron, one inch in diameter and of single lengths. The ends should be upset until sufficient stock is obtained to form the jaw and foot for attachment to the shell. This involves somewhat more labor than making them with welds, but a sound brace is insured, which is not the case with a welded brace. It is no unusual thing to find braces just welded up, and by good workmen too, which may be snapped in two like pipe-stems by striking them a sharp blow across the corner of an anvil. This is the common way of testing such work in some shops.

Fig. 2 shows a very common method of bracing the head of tubular boilers. Two pieces of L iron are riveted horizontally across the head of the boiler above the tubes. The braces are attached by pins passing through, the braces being held between the L irons as shown.

Fig. 4 is an enlarged view of this brace. It differs from Fig. 3 only in the form of the head, which is single instead of double. This makes a fairly good form of brace if it is properly constructed, but as a general rule it is not. If the braces were swung horizontally to the shell of the boiler, they would need only a comparatively slight twist, which could be put into the round portion of the body, to bring the foot fairly on to the shell, and they would then remain taut, but many boiler-makers bend them directly upwards to meet the shell; this necessitates a short bend near where they are attached to the boiler-head, in consequence of which they do not remain taut for any length of time. When we wish to resist a direct pull we should always use a straight piece of material to do it with. It is always wrong in principle to put a crooked brace into a boiler. It is, morever, entirely inexcusable.

Fig. 5 is the best brace of the three styles shown, if made without a weld, as it always should be. It is much better adapted for use on flat surfaces which are exposed to the action of furnace heat, such as furnace crowns, etc. It is no more nor less than the old-fashioned "crow-foot," and is really a hard brace to improve upon when well made. Care, however, should always be exercised in its construction and attachment to the boiler. We have found many braces of this style broken short off, with nothing to indicate how it was done, leaving it to be reasonably inferred that the breakage was due to original faulty construction.

Regarding the amount of bracing necessary to properly strengthen the flat surfaces of boilers and other vessels exposed to pressure, much has been said and written, and few experiments have ever been made, but those few are sufficient, to our mind, to settle the

question near enough for all practical purposes, that is, so that we always can, with due care, know when a flat surface is well braced. The question frequently arises, "How much pressure will a certain plate safely sustain?" It is generally brought up by the disastrous explosion of some boiler with an unbraced or poorly braced head. The question of the actual bursting strength of a boiler-head, say, ⅜ of an inch thick and 36 inches in diameter, may, under such circumstances, seem for a time an important one, and is so to a certain extent, but when we stop to think that such a head should *never* be run unstayed, we see that the maximum strength of the head itself is but a secondary consideration after all. The real question is, to know when the bracing is sufficient.

If we take such a boiler-head as that described above and subject it to hydrostatic pressure we shall find that a very low pressure, say 10 to 20 pounds per square inch, is sufficient to spring or bulge it much more than is allowable in practice. The only inference to be drawn from this fact is: We should always design the bracing of a boiler-head of any considerable size to take the *entire pressure on that surface.* This is necessary to prevent undue springing of the head.

The problem thus becomes a very simple one. We know the size of the exposed flat surface, we know the pressure at which we wish to run the boiler, and we simply put in enough material in the form of braces, which are exposed simply to tensile strain, to carry the load, allowing a due factor of safety.

How American Watches Are Made.

From an interesting book just published by the Fowler & Wells Company, of this city, entitled "Three Visits to America," by Emily Faithfull, we make the following extract describing what Miss Faithfull saw at the Elgin (Ill.) watch factory:

"The Elgin factory is built in the form of a block T. The wings stretch east, west, and south, and are each a hundred feet long. I confess I found the minute inspection of that great building about as hard a day's work as I could well accomplish. Passing from the room where the designers were busy drafting machinery, we entered the machine shop, and from thence into the plate room, where a number of women were at work at small lathes, some drilling the holes required in each plate, and others inserting the various steady pins in the bars and bridges. The department in which the wheels and pinions are manufactured interested me the most. There the girls were turning and shaping the various pieces, others making 'barrels'—the technical name of the mainspring boxes.

"One set gives a rough shape to the barrel, the next cuts to size the rim on which the teeth are cut, the third 'making place for the stop-work,' while others receive the barrels from 'the tooth cutters,' and give them a final touch with a sapphire cutter. The making of pinions is a very interesting branch of the work to the visitor. A little piece of wire, after a move or two of the lathe, comes out beautifully pointed; the next lathe trims it to the required shape. 'The triumph of mechanism' is said to be reached in this series of automatic lathes. The operative places the work in the tool, and sets it running; and when the cut is made, she removes that piece and substitutes another with such rapidity that more than 2,000 pieces of about one two-hundredth of an inch diameter are made in a day, a size which a hand watchmaker could not make without the aid of a strong glass. Other girls take blank wheels and place them in a stack under a bolt. A lever arm, which works a traversing bar, in which is a flying cutter, shaped like a tiny bird's claw, enables the operative to cut the necessary groove, another stack of blank wheels is advanced, and at last the whole circumference is filled with grooves, and you find twenty-five complete wheels with finished teeth; and each girl can make about 1,500 in ten hours.

"This work is then polished and finished by marvelous machines, which imitate the hand worker's motions with accuracy and rapidity, and without ever making any mistakes. The manufacture of screws is an attractive branch of the work; 20,000 of the smaller ones only weigh one pound. In the escapement department we found girls cutting and polishing ruby, garnet, and chrysolite with absolute accuracy. In London it takes an apprentice seven years to learn what a girl machinist becomes a proficient in after the first twelve months' work. The shaping and polishing of the pallet stones require to be done with great precision, but the perfection of the Elgin machinery calls for nothing from the operative but a due appreciation of the finish necessary to the acting planes and angles of the stones. The girls are also employed in the steel work of the pallets, levers, and rollers, and have lately been entrusted with some delicate details of the work which it was once thought would be beyond their capacity. They also fit dials and hands, match the wheels and pinions, get the watch ready for the gilder, make the hairsprings, put the trains into the movements, time the watches after they are set going, and, in fact, adjust the finished parts. In the painting of the dials the girls do not need a long apprenticeship, and are said to be able to equal masculine work both as regards rapidity and precision. The book-keeping department is entirely confided to female hands and heads. They are earning good wages. The workrooms are quiet, clean, and well ventilated, and a pretty apron covers the dress of the operatives, and gives them quite a pleasing appearance. About a hundred yards from the factory, a capital, well-organized hotel has been built for the benefit of the employes. The large dining-room is common property, but half of the rest of the house is assigned to the men, and the women have their own separate parlor, and a matron who looks after their welfare generally. Here they can live in comfort for a very moderate expenditure, and are close to their work. At Waltham there is not only a large boarding-house attached to the factory, but many of the operatives have been able to build some neat residences of their own on the company's land."

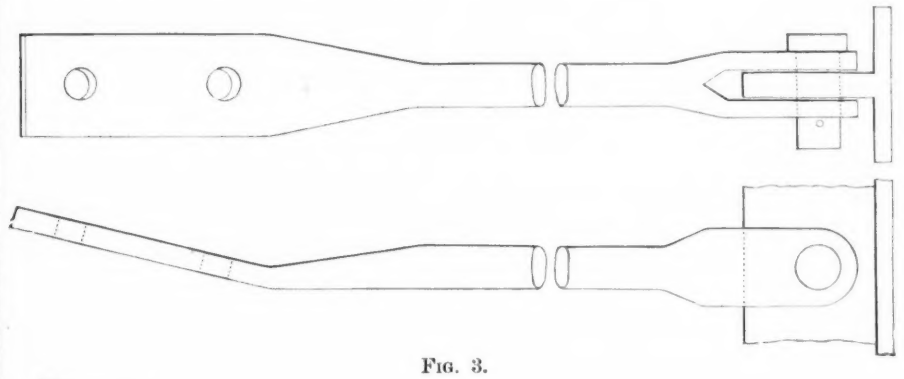


FIG. 3.

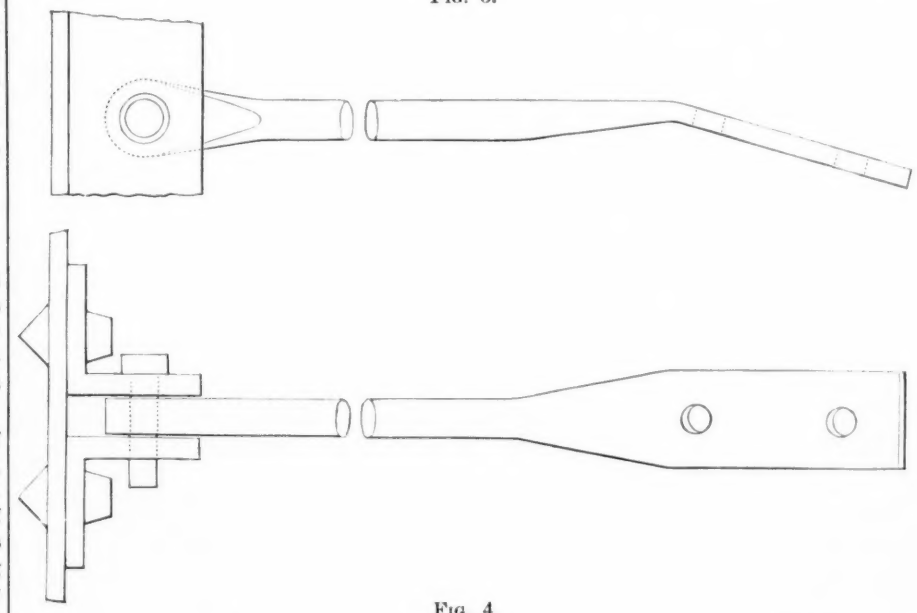


FIG. 4.

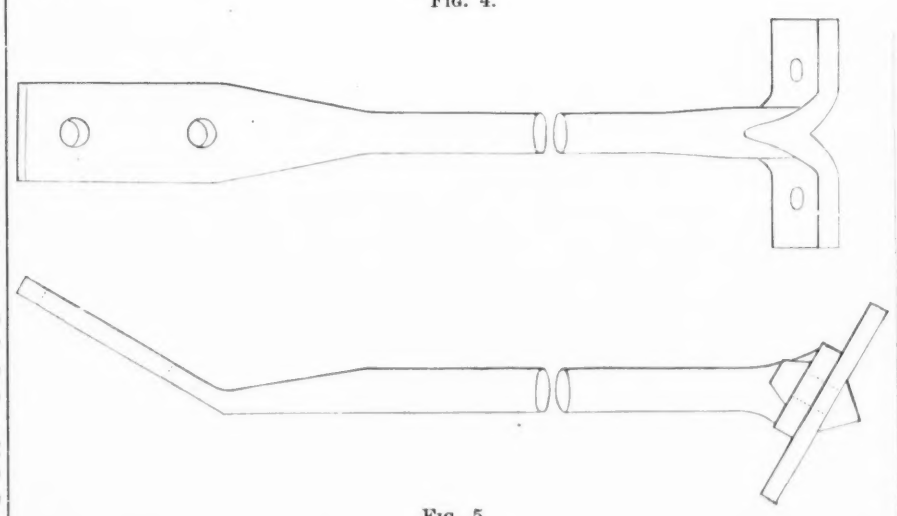


FIG. 5.

Snow-Melting Machine.

A public experiment was made in New York last week with a machine for melting snow, which the New York Snow-Melting Company is going to attempt putting on the market during the coming winter, to be used for clearing the streets of snow. The machine is a small locomotive boiler, ten feet long, having 84 flues, and carrying a melting tank on top, the whole rig being carried on a portable frame. The parties handling this machine believe it to be capable of melting sixty car loads of snow an hour, and that by its use the street car companies will effect a material saving in removing snow from their tracks.

If the boiler transfer heat sufficient to melt one-tenth of sixty car loads of snow, the quantity carried will be exceedingly small, or the boiler will produce extraordinary heating results. Many people have attempted to clear away snow obstruction by melting it, but in every case that we are aware of the effort has proved abortive, and in most of the attempts the mistake has been made of under-estimating the quantity of heat necessary to liquefy congealed water. Assuming the temperature of snow to be 32° Fahr., 142.4 heat units will be absorbed for each pound melted. In a simple form of melting-tank, like that under consideration, it is impracticable to melt snow and let the water escape at the melting point. The melting is done in a warm bath; consequently, the contents of the tank must be raised to a temperature considerably over 100°, or the work of liquefaction would be inordinately tedious. Let us suppose the water is kept at 120°, and run off at that temperature. To raise each pound of snow to this temperature, 230 thermal units will, at least estimate, be absorbed. The furnace has a grate area of about eight square feet, which, burning 14 pounds of coal to the foot each hour, would produce gases of combustion from 112 pounds of coal consumed, which is a high average from natural draft. Allowing each pound of coal burned to transfer 7,000 heat units to the water, it will be found at the end of an hour that the total work of liquefaction will fall short of reducing two tons of snow to water with a temperature of 120°. Should it be practicable to run off the water at the melting point of snow, the sixty car loads will have dwindled down to about three tons an hour.

Edgar Thomson Steel Works.

Quite extensive alterations have been effected on the Edgar Thomson Steel Works at Bessemer, Pa., since they were designed by the late Alexander L. Holley. When completed nine years ago, the works were regarded as the finest steel plant in America, and they hold the same reputation to-day, but great additional fixtures and numerous improvements have been added, in order to maintain the original prestige. In the first plan of the works the iron was smelted in the blast furnaces, and run into pigs, where it cooled. These pigs were transported to the steel works, broken up and remelted in a cupola, from which it was run into the converter. The method followed now is to melt in the blast furnace good ore, free from the impurities that unfit iron for steel-making, pour the molten iron into a huge ladle carried on a railroad car, and transport it quickly to the converter, where it is poured in without losing its heat. This saves great expense, directly and indirectly. It preserves the heat put in to melt the iron, and also saves the time and expense connected with the handling of material for remelting. The converters have been increased in capacity, so that each now holds a charge of seven tons. Natural gas has recently been applied to all heating purposes about the works for which it is adapted. All the boiler furnaces are heated in this manner, and natural gas has been utilized to some extent on the metallurgical operations. The effect of this change of fuel has been to reduce the consumption of coal 400 tons a day. One operation in the change dispensed with the services of forty firemen, and the army of men necessary to handle 400 tons of coal per day are at other occupations, or standing round the streets of Pittsburgh idle. Natural gas is a great benefit to Pittsburgh manufacturers, but the changes that its use entails are causing considerable hardship among the workmen whose labor it renders unnecessary. Of course, the surplus hands drift into other employments, but the transition takes time and causes suffering.

It is said, that since the adoption of Standard time by the railroads 400 applications for patents for an arrangement of the 24 hours on watch and clock dials have been rejected on the ground that such dials have been previously used.

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NEW YORK, NOVEMBER 8, 1884.

CONTENTS.

	PAGE
New 24-Inch Swing Engine Lathe	1
Heavy and Light Work Skimming Gates. By Thomas D. West	2
A One-Dollar Tap-Drill Gauge	2
The Blacksmith	2
Double Geared Car-Wheel Chuck	3
Machine Shop Floors	4
Expiring Wrench Patents. By F. R. Brock	4
Chicago Ice-Making Machinery	4
Powell's Iron Lathe Gear	5
Letters from Practical Men—To Disconnect a Locomotive with Broken Valve Yoke—Catechu or Gambier—A Question—Locomotive Fuel Economy—Spiral Attachments for Milling Machines—"The Safety Element"	5
Plan of Railroad Libraries	6
Personal	6
Methods of Bracing Boiler Heads	6
How American Watches are Made	7
Snow-Melting Machine	7
Edgar Thomson Steel Works	7
Fallacies of the Enemies of Protection	8
Patenting Obscure Devices	8
The Locomotive Firemen's Convention	8
Literary Notes	8
Questions and Answers	9
Manufactures	9
Machinists' Supplies and Iron	10

Fallacies of the Enemies of Protection.

Among the daily newspapers in New York City and Brooklyn that are uncompromising enemies of a protective tariff the New York *Times*, *Evening Post* and Brooklyn *Eagle* hold the highest rank. The latter, in a recent editorial headed "Protected Industries Everywhere Collapsing" depicts the present depression in some manufacturing industries in its worst colors. It advances the argument so often made (and as often answered) that men engaged in occupations which the tariff does not protect in this country receive higher wages than men similarly employed in Europe. The tariff *does* protect men engaged in producing articles upon which no duties are levied. The prosperity of industries depending directly upon the tariff means the prosperity of other industries depending upon them. Protection to the iron, cotton, woolen and other manufacturer means protection to the farmer and the merchant for the latter cannot flourish while the former are suffering depression from any cause whatever. The falsest and the easiest disproved argument advanced by free traders is that the tariff builds up and stimulates the growth of a number of special industries at the expense of all the others.

The *Eagle* puts this question:—"Will the advocates of a protective tariff, who insist upon it because it guarantees high wages to workmen in the industries that it affects, explain how it is that in these very industries men are either earning nothing or are working for a bare subsistence, like sixty cents a day in the mining regions?"

So far as the mining industries are concerned, the cause of low wages is that *not enough* protection is afforded to the workmen. Hordes of Hungarians are imported under contract to work for less than Americans, or independent emigrants have been willing to accept. This evil is increasing rather than diminishing, and unless there is a change in the attitude of our legislators upon this matter it is likely to go on increasing indefinitely. During the last Session of Congress a bill passed the House of Representatives to prohibit the importation of workmen under contract to labor, under penalty of $500 for each and every violation. This bill went to the Senate three or four weeks before adjournment, and there it was suppressed. Had the Senate been in favor of the bill it would have become a law and the evil would have been abolished.

The *Eagle* declares that: "When the average man bids adieu to prejudice, thinks for himself and draws his deductions from facts, he will observe that the Protectionist is a robber and a fraud, and that his true friend is the revenue reformer."

The so-called "revenue reformer" urges the cutting down of the tariff horizontally so that less revenue shall be raised by it. Strange as it may appear, British manufacturers are anxious for the same reduction so that they can sell more goods in this country, thereby swelling the tariff revenues. The former cry out against what they term a "prohibitory tariff," and persistently work to have it reduced, whereas if the tariff were really prohibitory or nearly so the very object the "revenue reformers" profess to be so anxious to gain would already be secured, viz.: a diminution of the revenue raised by the tariff. Any intelligent workman can pick out other glaring inconsistencies in the public professions of the enemies of our protective tariff. What the workmen of this country should have is not a cutting away of the protection now in force, but protection by law in matters not reached by the tariff. Manufacturing industries are more depressed in free trade England than in America. If protection causes the trouble here let the "revenue reformers" answer whether it is not the lack of protection that causes distress in that country?

Coal operators in Mexico ought to obtain good returns from the amount of capital invested in the business, if we are to judge of their expenses by the wages paid to their help and of their income by the price charged for the coal sold. The coal from mines recently opened in Coahuila is sold for $10 per ton, and the miners are paid $1.50 a day. Great returns for small outlay in the coal business are however not confined to Mexico. We recently heard a coal operator in Iowa protesting in a most vigorous style against granting a rise of wages asked by the miners. He would spend every dollar he was worth before he would grant the rise, and he urged his associates to act with equal firmness. Three years ago this man put $2,500 into the mines he is connected with, and the greater part of the money was borrowed. To-day he is quoted by the commercial agencies as being worth $75,000. That seems to be good returns on invested capital.

Patenting Obscure Devices.

We often hear the question asked, Why are so many patents taken out in this country for appliances that are never put on the market? No person well acquainted with machinery can go over the Patent Office records week after week, without being impressed with the fact that many impracticable devices receive the protection of patents; but the greater part of patented appliances that are never pushed into public notice are not originally designed for sale. Many ingeniously planned devices are got out for facilitating work in certain lines of manufacture that gives the owner some advantage over his competitors, and such inventions are often patented as a protective measure: while in other cases inventors of small devices often make a great mistake in thinking their invention not worth patenting till they see it become common property. Not infrequently a man invents something to produce work easier, and considers it too trifling for a patent; but a pirate comes along and sees the device, patents it, claiming it as his own, and finally compels the inventor to pay royalty for the privilege of using his own invention. This is no imaginary case, for we knew a machinist in Iowa who turned farmer, and among other improvements that his mechanical experience suggested was one on a plow clevis. He sketched the improvement, and went to a blacksmith and had a clevis made after his design. Several of his neighbors perceived the merit of the device, and had others made like it. Two years afterward a man came round and claimed that the clevis was his invention. He produced patent papers to show that he had obtained a patent on the device, but it was taken out after our machinist-farmer had perfected it. An expensive lawsuit would have probably demonstrated that the patentee had stolen the property from the real inventor; but the farmers were not prepared to enter into tedious litigation, so they all paid the royalty, the inventor among the others. The moral of the tale is that an inventor who wishes to retain the right to use an invention, should patent it if the device is worth the expense.

The Locomotive Firemen's Convention.

At the eleventh annual convention of the Brotherhood of Locomotive Firemen, held at the city of Toronto, Ont., September 23 to 29, many important questions came up, and some changes were made.

A report of the grand officers showed a membership of 12,000 and 240 lodges, against a membership of less than 8,000 and 126 lodges one year ago. It showed a surplus in the treasury of about $20,000, and that the institution is in a flourishing condition in every way.

The project of founding a Home for disabled engine men, that was agitated one year ago, was indefinitely postponed, it being deemed impracticable, as not one in five hundred would go to a distant place to a poor-house when they could stay with friends and do something with their insurance, as the full amount is paid upon a total disability. It being the opinion of the grand secretary and treasurer that the insurance could be raised without more than one assessment of one dollar per month, it was accordingly raised from $1,000 to $1,500.

All members are insured.

Provisions were made for cleaner bills of health for applicants, including a physician's certificate; and several changes were made in the constitution and by-laws, drawing the lines of membership more closely, covering defects and caulking leaks that have existed heretofore.

The office of grand master was made a salaried office, and his duties defined.

Appropriations to the amount of $13,000 were made.

The grand secretary and treasurer, also the grand organizer and instructor were re-elected. A new grand executive committee was elected and installed, and the offices of twelve district corresponding secretaries were abolished.

Messages of friendship were received from the Engineers Brotherhood, the Brakemen's Brotherhood, the Order of Railway Conductors, and the Train Dispatchers' Association. At the solicitation of the latter, the convention declared in favor of a universal system of train signals.

A proposition to favor an effort to secure legislation to require locomotive engineers to be licensed, same as marine engineers, was rejected.

At the opening exercises the local authorities were present, and the boys welcomed to the Province by the Lieutenant-Governor, and to the city by the Mayor.

The body adjourned, to meet at the city of Philadelphia, on the third Monday in September, 1885.

The rapid increase in membership of this valuable association is unparalleled, and appearances indicate that in a few years it will be the strongest industrial organization in the country. A most commendable feature of the Brotherhood is the strict requirement that all shall be members of the insurance. The organization is exercising a most beneficent influence on locomotive firemen as a body, and all railroad managers who have examined its working recognize its usefulness.

We find the following in the Boston *Commercial Bulletin:*

Joseph Stone, superintendent of the Central Pacific Mill, Lawrence, was before the police court Wednesday, to answer to four separate complaints charging him with employing women more than sixty hours in a week. Judge Harmon found that the girls did not go to work before bell time; that they did not work more than the apportioned time, which was ten hours and fifteen minutes per day, and found the defendant not guilty.

If the above item gives a correct specimen of the decisions of a Lawrence police judge, that city must have the most accommodating courts of justice to be found anywhere outside of the wild Western regions, where men are always hanged for horse stealing. The decision that ten hours and a quarter per day do not make over sixty hours in a week of working days, is about equal to a legal decision that thirty-five quarts do not make more than a bushel.

Literary Notes.

"Ayer's Newspaper Annual for 1884," is a volume of nearly 1,000 pages. It gives a complete catalogue of American and Canadian newspapers, naming in each case the time of issue, political or other character, when established, size and number of pages, circulation (when ascertained) and advertising rates. It also gives the population of each city and town where a paper is published. A list of papers is also given by counties, with a description of each county. Lists are also given of papers according to classification, religious, agricultural, mechanical, &c. There are 13,334 newspapers and periodicals published in the United States and Canada, of which 10,172 are weekly, and 1,274 daily. Last year's Annual made the total number 738 less than this year. This directory of newspapers is the best of any now published to the best of our knowledge. The publishers give very careful attention to all details necessary to make it full, accurate, and reliable. Wherever

publishers have been willing to swear to their circulation that fact is noted. Only 15 newspapers in New York city were willing to testify to their statement of circulation, although all were invited to do so. The circulation of the AMERICAN MACHINIST has always been sworn to for the Annual. Wherever the statement of actual circulation is true we hold that there can be no valid objection to making affidavit to the same. Only two New York dailies testify to circulation, neither of which is much over 16,000 copies. The directory is so arranged that the record of any paper may be readily found. There are a large number of advertisements, but not one is placed in the directory portion. All advertisements appear in the last part of the volume. N. W. Ayer & Son, Philadelphia, Pa., are the publishers.

"*The Medical Chronicle:* A Monthly Record of the Progress of the Medical Sciences," is a new medical magazine just started in Manchester, England. It is edited by James Niven, M. A., M. D., and W. J. Sinclair, M. A., M. D., and published under the direction of a committee of prominent physicians. A feature of the magazine is that the name of the writer is signed to every article, even to the editorials. J. E. Cornish, Manchester, is the publisher. One of the articles is headed "On the Treatment of Duypuytren's Contraction of the Fingers." If this article had appeared in an American magazine, we should have expected to find, by reading it, that Duypuytren was a bank officer who had taken a trip to Canada, and that before going his fingers had contracted upon all the loose funds in the vaults.

QUESTIONS AND ANSWERS.

Under this head we propose to answer questions sent us, pertaining to our specialty, correctly, and according to common sense methods.

Every question, to insure any attention, must invariably be accompanied by the writer's name and address. If so requested, neither name, correct initials, nor location will be published.

(429) **A. F. B., Cleveland, O., asks:** What is the bluish lacquer used on iron and steel? *A.*—Varnish, to which a little Prussian blue is added.

(430) **L. F., Brooklyn, N. Y., asks:** 1. What will dissolve beeswax? *A.*—Bisulphide of carbon, benzine, or any volatile oil. 2. Of what is the Stow flexible shaft made? *A.*—Of wire.

(431) **S. E. D., Manchester, Conn., asks:** Is there any process for making polished brass retain its luster? *A.*—Brass is lacquered to prevent tarnishing. For making and applying lacquer, see AMERICAN MACHINIST of March 4, 1882, and May 12, 1883.

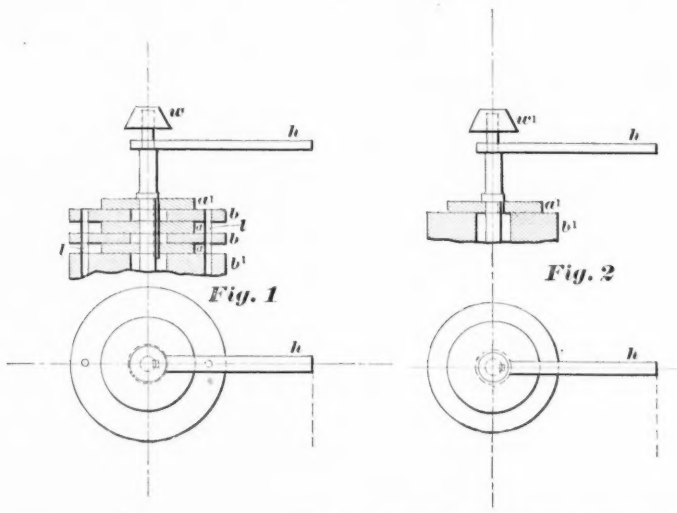
(432) **G. G. K., Detroit, Mich., asks:** Will oxalic acid, mixed with water in the proportion of one teaspoonful of acid to one pint of water, as it is generally used on brass harness trimmings, soften a steel spring? *A.*—It will have no effect on the temper of the spring.

(433) **E. L., London, Ont., asks:** 1. By what process is extra strong oil of vitriol made, such as is used in manufacturing explosives? Can iron stills be used for concentrating? *A.*—Platinum stills are used. 2. What is "slush" for covering the finished parts of machinery made of? *A.*—Frequently of tallow and white lead.

(434) **F. H., Westport, Mo., writes:** In your issue of October 11, in giving proportions of slide valve for 10"x12" engine, you advise ¾" inside lap. Will you please explain your reasons for so much exhaust lap? I notice you always recommend exhaust lap. What is its effect on coal consumption? *A.*—In the instance to which you refer the outside lap was ¾", so with ¼" inside lap the exhaust port would be open ½" *plus* the steam lead at the end of the stroke. We advised the ¼" inside lap for the purpose of closing the exhaust a little earlier in the stroke and getting a little more cushion for the piston, making the engine run smoother. We do not always advise inside lap, but in most instances where a lap valve is used a little inside lap is, we think, is advisable. Generally the effect on the coalpile is not noticeable: it is more a question of smooth running.

(435) **A. D. V., Laceyville, Pa., asks:** 1. What will prevent my stack from burning out? It is iron, and we use shavings for fuel. It burns out about twice a year. *A.*—We suppose it is the lower part of it that burns out, from the intense heat from the shavings. You might build up a chimney, say fifteen or twenty feet high, and put iron stack top of that. Other than this, we should say make it of heavier iron. 2. Why is it not better to use a small cylinder with long stroke than a large one with short stroke, and so get so much less area for atmospheric pressure to act against? *A.*—Doing a given amount of work, at the same piston speed and the same mean effective pressure, the diameter of the cylinders will be the same, whether the stroke is long or short. As the two classes of engines are made, the resistance of the atmosphere is substantially equal.

(436) **G. S. A., Worcester, Mass., writes:** In Fig. 1, a' is fastened to the shaft; a, a are secured by a spline, but are free to move up and down; b' is a fast base; l, l are bolts fast in b', on which b, b are free to move up and down, but which restrain them from revolving. By the handle h the shaft, with the weight w, and flanges a', a, a may be revolved. Fig. 2 is the same as Fig. 1, without the parts a, a; b, b and l, l. Will it require more power to turn the handle in the case of Fig. 1 than in Fig. 2, and if so, how much more? *A.*—The arrangement is similar to that long used for producing friction. In Fig. 1, suppose you have a pressure between the surfaces a', b of 100 lbs., due to the weight w, you will have the same pressure on the four other surfaces that move in contact; a pressure of 500 lbs. altogether; in Fig. 2 the pressure on surfaces in contact will be only 100 lbs. It will require five times as much power to turn the handle of Fig. 1 as it will Fig. 2.



BUSINESS SPECIALS

Transient Advertisements, 50 cents a line for each insertion under this head. About seven words make a line. Copy should be sent to reach us not later than Wednesday for the ensuing week's issue.

Katzenstein metallic packing, 169 Christopher st., N Y

Curtis pressure regulator and st'm trap. Oct. 25, p. 13.

Mackenzie Cupolas and Blowers, 245 Broadway, N.Y.

Presses & Dies, Ferracute Mach. Co., Bridgeton, N. J.

Steel Name Stamps, &c J. B. Roney, Lynn, Mass.

Rotary Files, Tower M. Works, E. Brookfield, Mass.

"How to Keep Boilers Clean." A book mailed free, by James E. Hotchkiss, 86 John street, N. Y.

Friction pulleys and couplings; cheapest and best H. N. Bates, 358 Atlantic avenue, Boston, Mass.

Herbert W. T. Jenner, Mechanical Engineer and Solicitor of Patents, 632 F st., Washington, D. C.

Lyman's Gear Chart. How to lay out gear teeth. Price 50 cents. E. Lyman, C. E., New Haven, Conn.

Foot Power Machinery, for workshop use, sent on trial if desired. W.F. & John Barnes, Rockford, Ill.

The latest Improved Tack and Match Machinery is made by White Machine Co., Waterbury, Conn.

Pattern and Brand Letters. Vanderburgh, Wells & Co., corner Fulton and Dutch streets, New York.

Consulting Engineer and Mechanical expert, C. C. Hill, 84 Market street, Chicago, Ill.

R. Dudgeon, 24 Columbia st., New York, Improved Hydraulic Jacks and Roller Tube Expanders.

National and box chucks, foot and power lathes, and slide rests. Lodge, Barker & Co., Cincinnati, O.

Split Pulleys at low prices, and of same strength and Appearance as Whole Pulleys. Yocom & Son's Shafting Works, Drinker St., Philadelphia, Pa.

Mech'l drawing and machine designing, work requiring skill and experience solicited. Reasonable rates. Corresp'nce invited. Weston & Smith, Syracuse, N.Y.

DRAWINGS — Mechanical, electrical and Patent Office. All styles of artistic designing. Special facilities. Low rates. Wallace Metcalf, 140 Nassau St., N.Y.

Guild & Garrison's Steam Pump Works, Brooklyn, N. Y. Steam Pumping Machinery of every description. Send for catalogue.

The "Wax Process" Engravings shown in the AMERICAN MACHINIST each week are made by Struthers, Servoss & Co., 32 Frankfort Street, N. Y.

Engine Lathes, Hand Lathes, and other fine tools. Assortment large: prices low. Frasse & Co., 62 Chatham St., N. Y.

Farley's Reference Directory of the Machinists, Iron, Steel, and Metal-Working trades of the United States. A. C. Farley & Co., Philadelphia, Pa.

Improved Tack Machinery, made by The Willets Man'f'g Co., can be seen in operation at their works, 57 Clifford St., Providence, R. I.

The Complete Practical Machinist, $2 50; the Pattern Maker's Assistant, $2.50; Mechanical Drawing Self-taught, $4 00; books for practical machinists. Address, Joshua Rose, Box 3,306, New York City.

EXTRACTS FROM CHORDAL'S LETTERS, 400 pages, 12mo., handsomely bound in cloth. New and enlarged edition, with over 50 illustrations. Price $2. Published by John Wiley & Sons, 15 Astor place, New York.

Useful Information for Steam Users—A 100-page pamphlet, on the care and management of the steam engine and boiler, with hints and rules for engineers and firemen. Every engineer should have this book. Send 25c. in P. O. stamps to the J. N. Mills Publishing Company, 145 Broadway, N. Y.

MANUFACTURES.

An extension is being built to the Haverhill, Mass., iron foundry.

An iron foundry is being erected at Brenham, Texas, by C. Banks.

William Wall's Sons, Brooklyn, N. Y., will erect an addition to their cordage factory, to cost $18,000.

P. H. McManus will erect a five-story factory, to cost $16,000, at avenue A and 75th street, New York.

The principal shops of the Louisville, New Orleans and Texas Railroad will be located at Vicksburg, Miss.

The Westinghouse Machine Company, Pittsburgh, Pa., are making repairs and additions to their works.

E. Moreton, of Chicago, contemplates establishing a $150,000 furniture factory and saw mill in Yazoo City, Miss.

Extensive additions are being made to the rolling mill of P. L. Kimberly & Co., Greenville, Pa. They will cost $12,000.

The Southern Machinery Company, Shelbyville, Tenn, have purchased ground for the erection of new machine shops and foundry.

Peter Reidenbach, 48 Delancey street, New York, will erect, at 142 Eldridge street, a brick factory 25x80 feet, five stories high, to cost $19,000.

William Manchester & Sons, Pittsburgh, Pa., are manufacturing anvils from 135 to 400 lbs. weight. They are made of iron and faced with steel

The St. Louis Malleable Iron Company have discharged their liabilities to their creditors, the secretary says, and resumed operations at their works.

A company to manufacture printing presses to print on both sides of the paper direct from the type has been organized at Brockton, Mass., with $150,000 capital.

A company known as the R. D. Cole Manufacturing Company, with a capital of $50,000, has been organized at Newnan, Ga., to operate machine shop and sash factory.

George Westinghouse, the inventor of the air-brake, is at work upon a burner which will make practicable the use of natural gas as an illuminant as well as a fuel.

The bar'l grows in importance as the political campaign draws to a close. The striking coopers of Detroit have resumed work at an advance of $1 a week over their former wages.

The Grand Rapids *Morning Telegram* says: A large foundry and machine shop, employing sixty men, is assured for Battle Creek, Mich., her enterprising citizens having raised a bonus therefor.

It is the intention of the Bethlehem (Pa.) Iron Company, to extend the eastern end of their new mill several hundred feet, which will greatly facilitate their work. The extension will be built of iron.

It is proposed to maintain the present display of machinery at the St. Louis Exposition, in the shape of a permanent machinery exchange, open daily throughout the year, and with steam up ready for use.

Hammond & Jennison, carriage manufacturers, Foxcroft, Me., have added new machinery to their wood-working shop. In a few weeks their iron-working shop will be completed and ready for business.

The proposed reduction of 12½ per cent. in the wages of the employes of Oliver Brothers & Phillips, Pittsburgh, Pa., has been withdrawn, and work in the mills will be resumed immediately at the old wages.

The Nonotuck Silk Company, at Haydenville, Mass., have a force of men improving the mill property which they bought some months ago, preparatory to putting in machinery and starting up the works.

The Canfield Rubber Works, of Middletown, Conn, are putting up a four-story brick factory in Bridgeport, Conn., the building to cost $13,000. They expect to remove their business to Bridgeport within two months.

The M. C. Bullock Manufacturing Company, of Chicago, has issued a fine illustrated catalogue of the Straight-Line Engine, as manufactured by them. All the parts of the engine are illustrated and described.

A new machine shop, 30x60 feet, one story, is to be built at Abington, Mass., by Arthur B. Phillips, a graduate of the Institute of Technology, class of '84. Ground has been broken, and the work will be pushed as fast as possible.

C. Franckenhoff, 44 Astor House, New York, engineer of the sugar machinery department of the Southwark Foundry and Machine Company, of Philadelphia, has just received forty tons of sugar machinery from that company to go to Laguayra, S. A.

Mr. Aiken, of Louisville, Ky., who is under contract with the Elyton Land Company to build a foundry and machine works in Birmingham, Ala., is getting bids from the lumber men for the material for his building, and says he intends to commence work very soon.

The Auburn Steam Power Company, a corporation now forming in Lewiston, Me, will, next spring, build a brick block of three or four stories, with room for power shops overhead, on the old Miller and Randall property, Main street. Work has begun on the boiler building.

At a meeting of over fifty prominent business men of Pittsburgh, it has been decided to organize a stock corporation, having a capital of $250,000, with the privilege of increasing it to half a million dollars, for the purpose of erecting and maintaining an exposition building in that city.

The E. Horton & Son Company, Windsor Locks, Conn., have brought out a new car-wheel chuck, upon which a patent is pending, and have added two new sizes to their regular lathe chucks, viz.: 5" and 22". They are determined to keep up to the times, or perhaps a little ahead of the times, in their line.

The Link Belt Machinery Company, Jefferson street, Chicago, have a finely-arranged shop for carrying on the mechanical work on the numerous specialties which they manufacture. The T. C. Massey vises are made here, and there is quite an active demand for this article. Business is quiet in most other lines.

The Leighton & Wilder Automatic Knitting Machine Company, of Manchester, N. H., are desirous of coming to Bath, Me., and starting a factory in the old Patten Car Works, provided citizens of that place will subscribe $40,000 to their capital stock of $100,000. If they come they will manufacture both machines and goods.

William Baragwanath has got well advanced with the new shop which he is putting up in Division street, Chicago. The shop is 150x75 feet, and it will be ready in about a month. The most approved machinery for boiler work is being put into the shop, and the proprietor believes it will be the best of its kind in Chicago.

Trevor & Co., Lockport, N. Y., have issued an illustrated catalogue of forty-two pages, describing their various specialties in wood-working machinery, also a twenty-page catalogue of handle rod and dowel machinery. All the machines are well described. They build a number of machines for stave and shingle making.

George Ryer, superintendent of water works, Nashville, Tenn., will receive bids for a battery of boilers of 600-horse power, with furnaces all complete, for that city, up to November 1. The city will furnish the material (except iron) for the furnaces. Bids must give a guarantee of evaporative duty. Steam pressure to be 80 to 100 lbs.

D. R. Wing & Co., Little Rock, Ark., have issued a fine illustrated catalogue and price-list of machinery. It contains about one hundred pages, and is one of the best Southern machinery catalogues we have seen. The firm are agents for machinery, engines, boilers, cotton gins, saw mills, corn mills, etc. They also have a machine shop and foundry.

The Houston *Post*, of October 16, says: James Higgins, contractor and builder, has contracted with the Marshall (Tex.) Car-Wheel and Foundry Company to erect their main building, which is to be of brick, 75x260 feet. Excavation for the foundry commences to-morrow, and the work will be pushed to completion as rapidly as men and money can do it

T. J. McGuire and M. Rouse are erecting a machine shop and foundry, at Dushore, Sullivan county, Pa., for the manufacture of McGuire's improved gang lath machine, also shafting, couplings, pulleys, forgings, and castings of every description, and mill gearing. They also deal in engines and boilers. The machine shop is 50x70 feet, moulding-room 35x50 feet, blacksmith shop 30x40 feet.

The Chicago *Industrial World* says: The Ogden Engine Company is the name of a new concern lately incorporated, with a capital of $10,000, for the manufacture of high-speed electric-light engines. The works are located at 40 and 42 West Quincy street, and are 55x80 feet in size, and are being fully equipped with the latest improved machinery for the prosecution of their business, costing about $16,000. The president of the company, Mr. E. J. Ogden, expects the works to be in running order by November 1.

Machinists' Supplies and Iron.

NEW YORK, October 23, 1884.

The condition of the supply trade remains in the same unsatisfactory condition that it has held for months. The promises of increased activity to meet the demands of the fall trade are not realized. The existing political excitement is not conducive to improve ordinary business, and dealers now express the hope that a change for the better will intervene when the election is over.

There is no particular change in the condition of the machine trade. Prices are very low, and leading dealers complain that this is due in a great measure to irresponsible parties selling goods below cost, for the purpose of raising money.

There has been a slightly improved tone in boiler plate adapted for structural purposes, but all other classes of manufactured iron are slow and unsatisfactory. For a week or two there was a slight prospect of steel rails rising in value, but makers have returned to the old practice of free competition and cutting of prices.

It would be hard to conceive how the American pig-iron trade could reach a more unsatisfactory condition. Buyers continue to follow the policy of buying merely sufficient to meet current wants, and sellers favor buyers to the edge of loss. For the ordinary business of the country, it is apparent that the means of supplying pig iron is much in excess of the demand, and the weakest members of the overcrowded industry will be gradually forced out. The best Lehigh brands are quoted $19.50 to $20.50, but other makes can be bought for 50c. to $1 less. No. 2 X Foundry is offered at $18 to $19, and Grey Forge $15.50 to $16.50, but in neither case has the demand any activity.

The demand for Scotch pig is slow and irregular, with prices unsettled. We quote Shotts $21.50 to $21.75; Coltness $22, to arrive, and $22 50, from yard; Glengarnock $20.50, to arrive; Gartsherrie $21.50 to $22; Langloan $21; Dalmellington $19.50.

Copper—The demand for ingot remains dull and nominal. Lake can be bought for 12⅞c. to 13c., other brands 11¾c. to 12¼c.

Lead—The market for common pig has ruled dull but steady. Prices from 3.70c. to 3 75c.

Tin—There has been an upward movement in this market abroad, and it has influenced our prices, which have ruled higher, although the volume of business has been small. We quote, for jobbing lots, Banca 19¾c. to 19⅞c; Straits and Malacca at 17⅝c. to 17¾c.

✻WANTED✻

"Situation and Help" Advertisements, 30 cents a line for each insertion under this head. About seven words make a line. Copy should be sent to reach us not later than Wednesday morning for the ensuing week's issue.

Situation wanted, by a first-class pattern maker. Address BOX 3, AM. MACHINIST.

A young man wants position as book-keeper, cost clerk, or mechanical draughtsman, in factory or machine shop. Moderate salary. "American," care AM. MACHINIST.

A practical, licensed engineer, thoroughly experienced with dynamos, electric lights, and high-speed automatic cut-off engines, wants a situation. Address "Engineer," 1214 Brown st., Phila., Pa.

Wanted--Situation as foreman brass moulder. Well up in locomotive and general work. Go anywhere—Englishman. Address R. E., 746 De Kalb avenue, Brooklyn, N. Y.

Wanted—Situation by young man of considerable experience in wood work. Prefers pattern making. Best of references. Address J. M. Richardson, 25 Patton street, Springfield, Mass.

Foreman wanted—To take charge of a small iron foundry, short distance out of New York City, making all kinds of machinery castings. A thoroughly practical and reliable man can find a good situation by addressing "Reliable," AM. MACHINIST.

50 Per Cent. of time and labor saved by using this solid, strong, durable, quick-working Vise. Has the improved taper, pipe and other attachments. Sold by trade. Send for circular.

MELVIN STEPHENS, Prop'r, Office, 41 Dey Street, New York.

PATENTS! Thomas P. Simpson, Washington, D. C. No pay asked for patent until obtained. Write for inventor's guide.

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BY SILVANUS P. THOMPSON, B.A., D.Sc.

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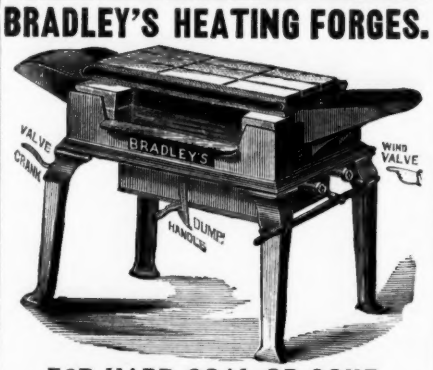

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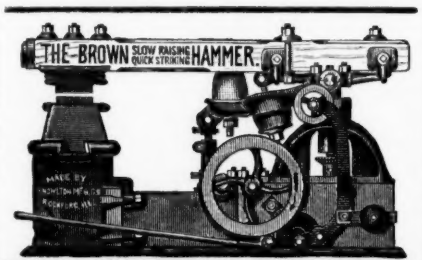

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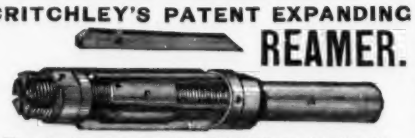

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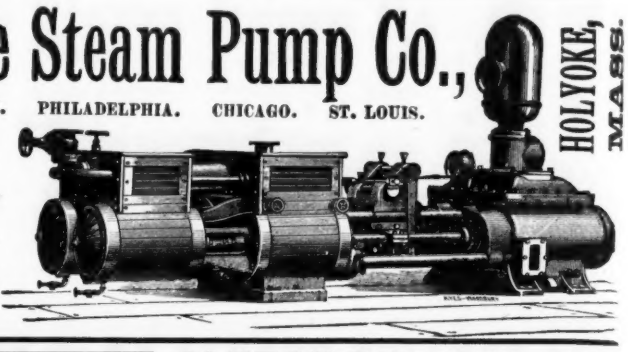

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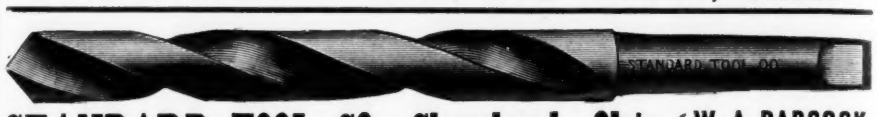

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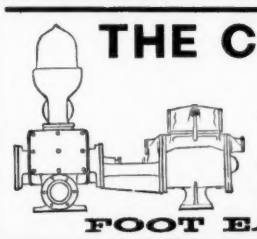

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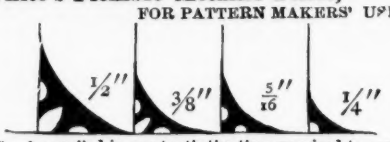

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See illustration in AMERICAN MACHINIST, issue dated November 1, 1884.

Patents Negotiated Abroad.

THE AMERICAN AND FOREIGN INDUSTRIAL ASSOCIATION, of New York, undertakes the sale of Patents in Europe. Is connected with the "Joint Stock Association" of London, and has Agents in Paris, Brussels and Berlin. Inventors should consult the Association, if possible, before making applications for Patents. Many foreign patents are rendered worthless by defective specifications, or by premature issue of American patents. For further particulars address HENRY A. HERBERT, President, 155 Temple Court, New York.

Office THE DOMESTIC MFG. CO.,
Newark, N. J., Sept. 18, 1884.

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Yours truly, S. A. DAVIS, Supt., Domestic Mfg. Co.

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Bids will be received, until November 1st, 1884, for furnishing and placing in position at the Water Works in Nashville, Tenn., one battery of boilers and furnace complete. Capacity of boilers to be 600 horse-power.

Material for furnace, excepting iron, to be furnished by the city. Bids must be accompanied with drawings and description of style of boilers, material used and workmanship, also giving a guaranteed evaporative duty in pounds of water evaporated to one pound of coal, no deduction for ashes. Coal to be used the Hecla Kentucky Coal.

Steam pressure to be from 80 to 100 pounds per square inch, temperature of feed water 125 degrees Fahrenheit.

Right is reserved to reject any and all bids.

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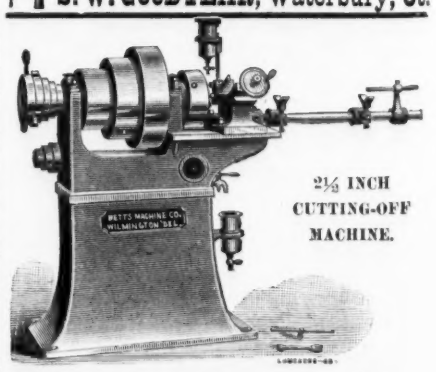

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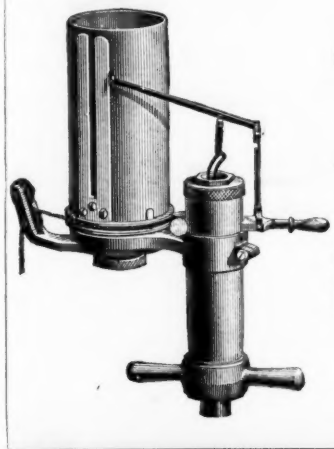

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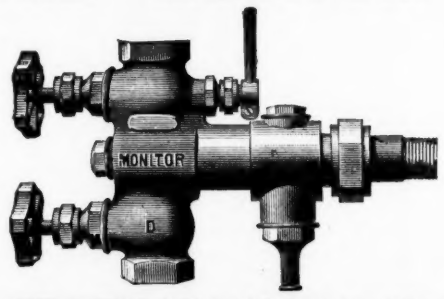

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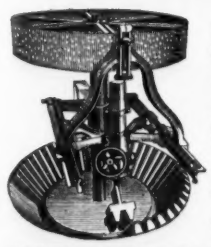

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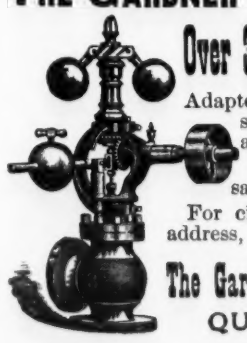

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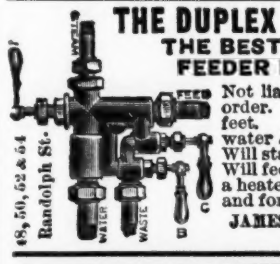

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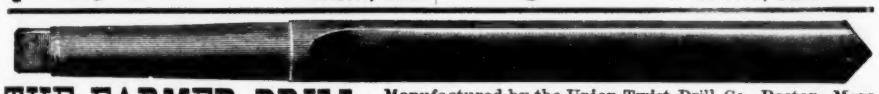

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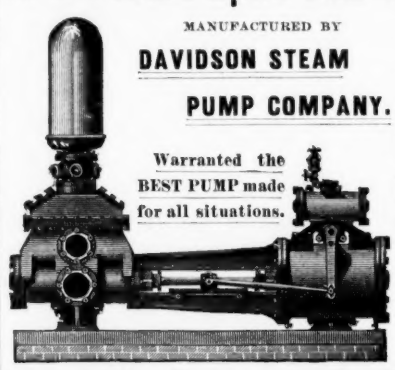

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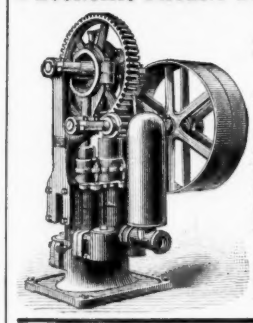

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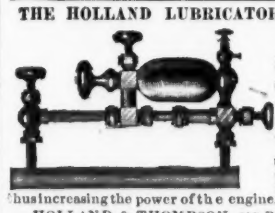

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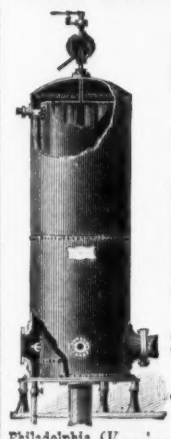

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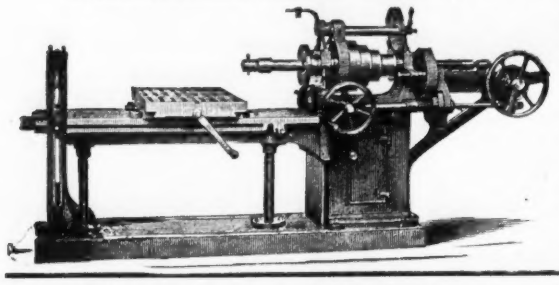

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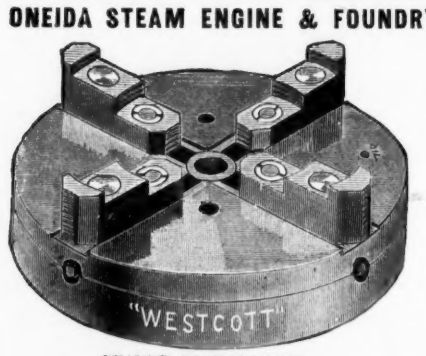

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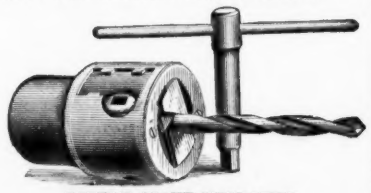

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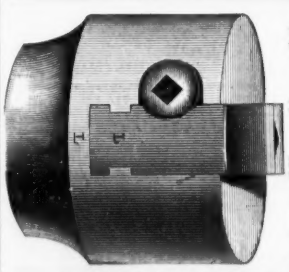

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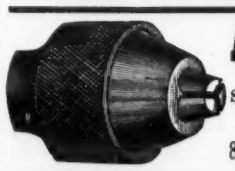

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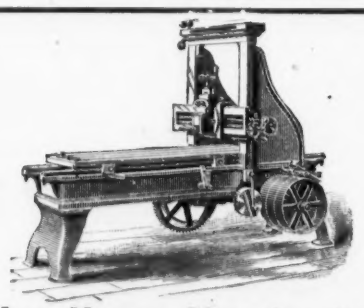

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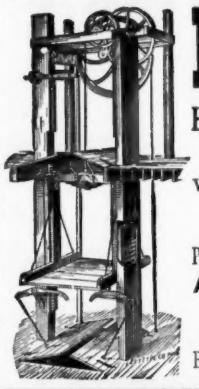

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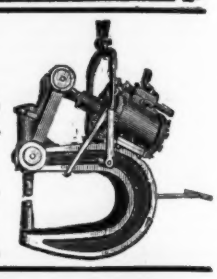

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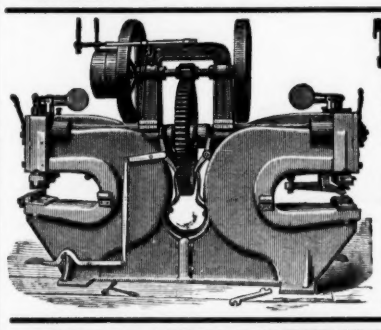

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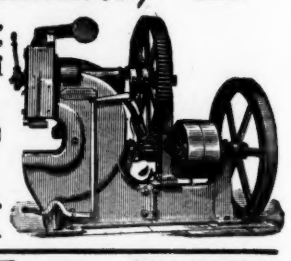

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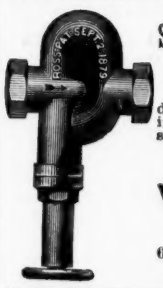

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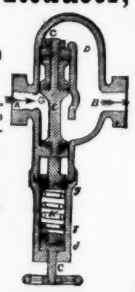

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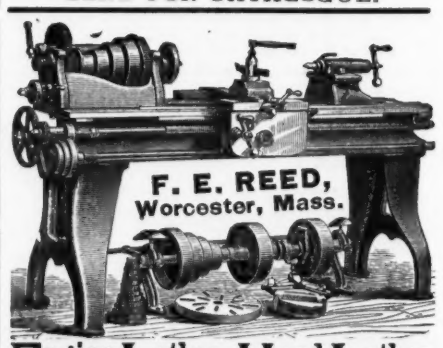

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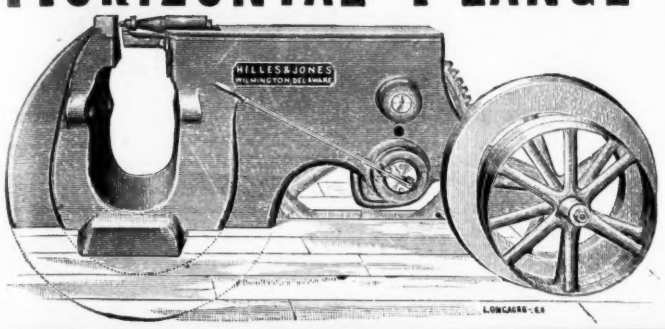

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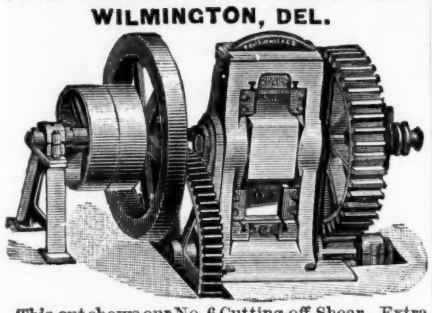

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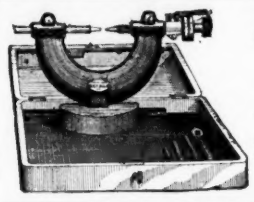

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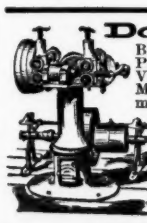

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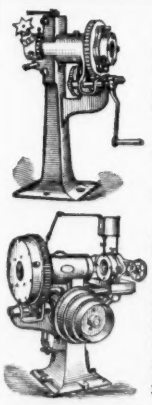

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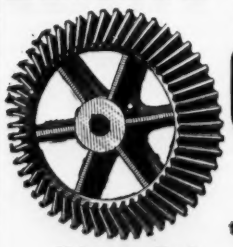

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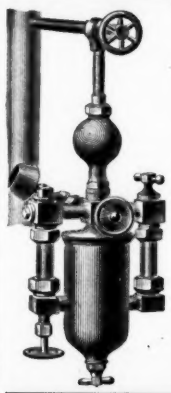

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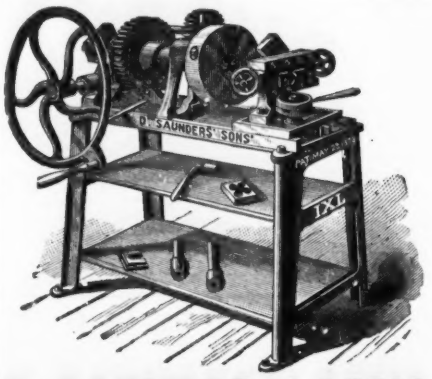

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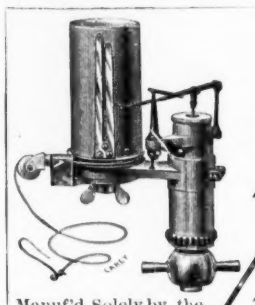

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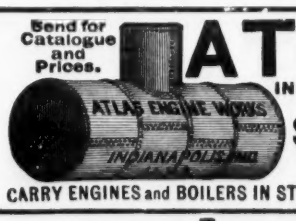

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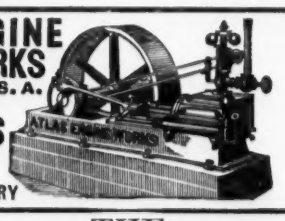

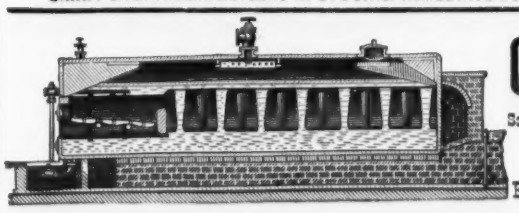

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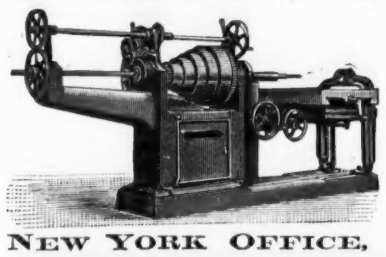

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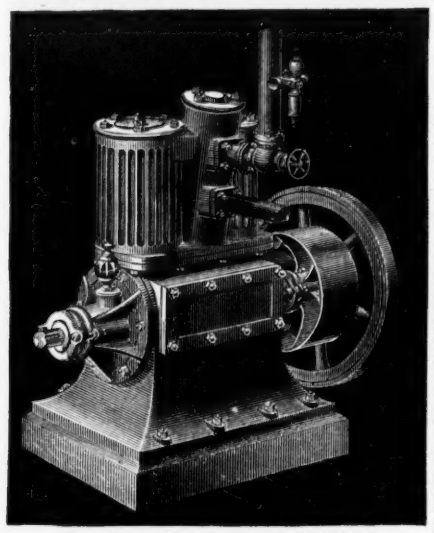

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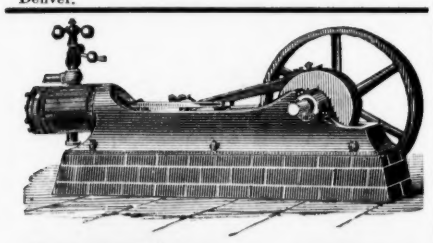

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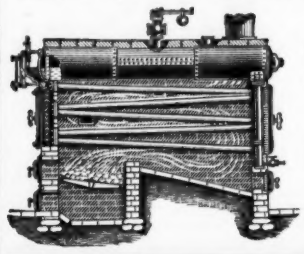

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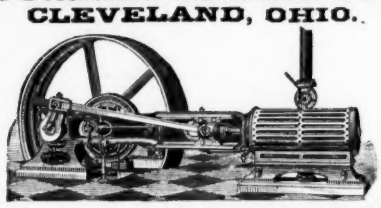

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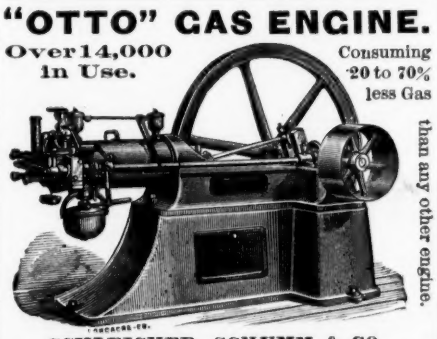

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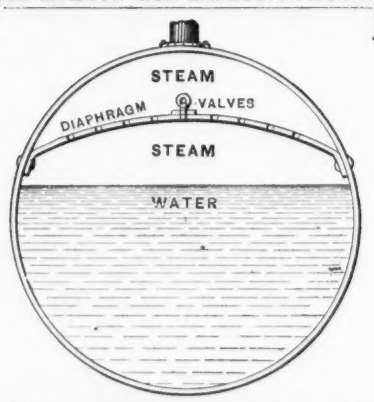

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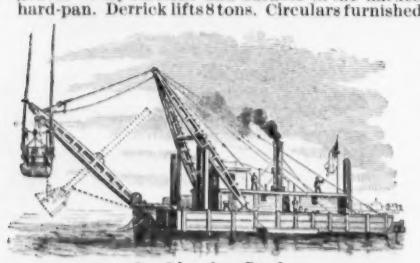

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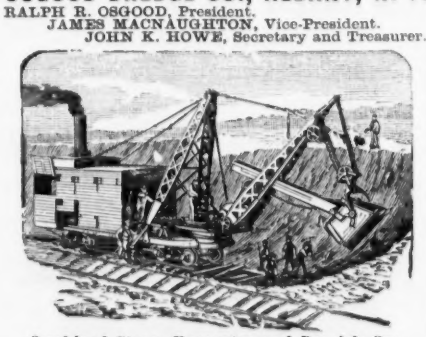

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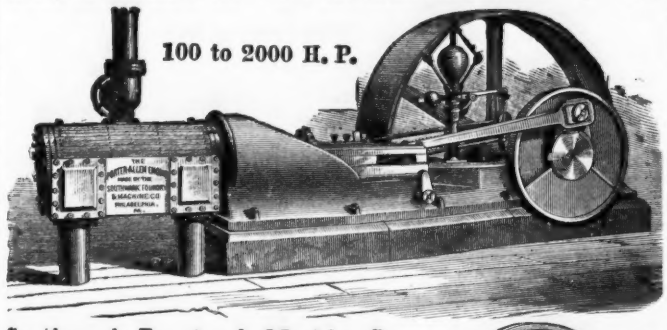

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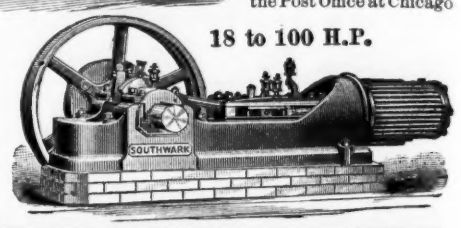

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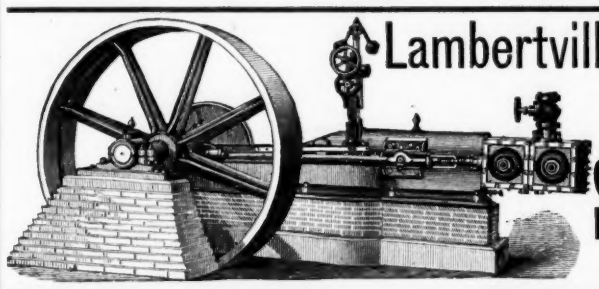

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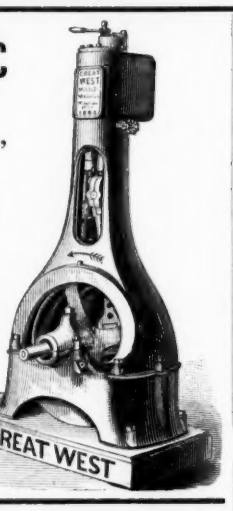

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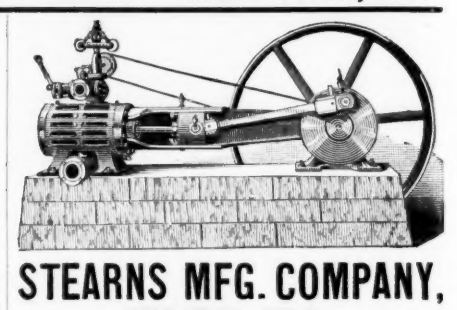

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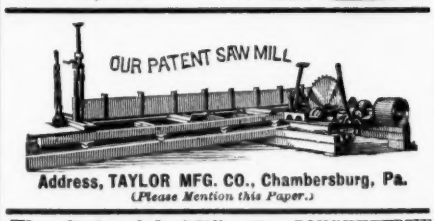

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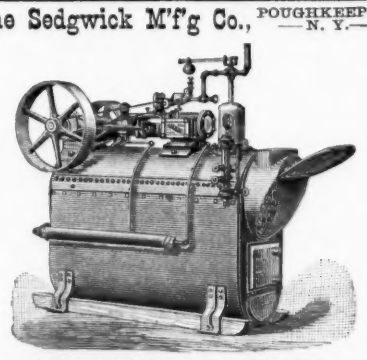

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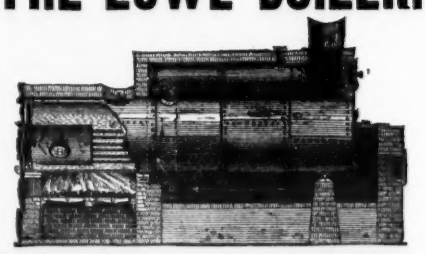

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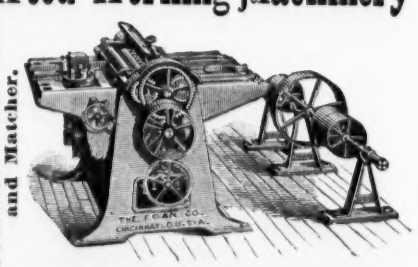

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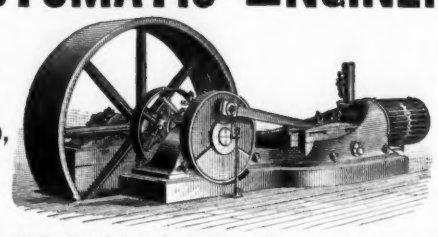

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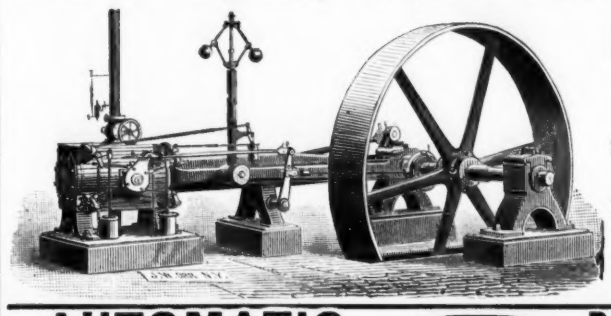

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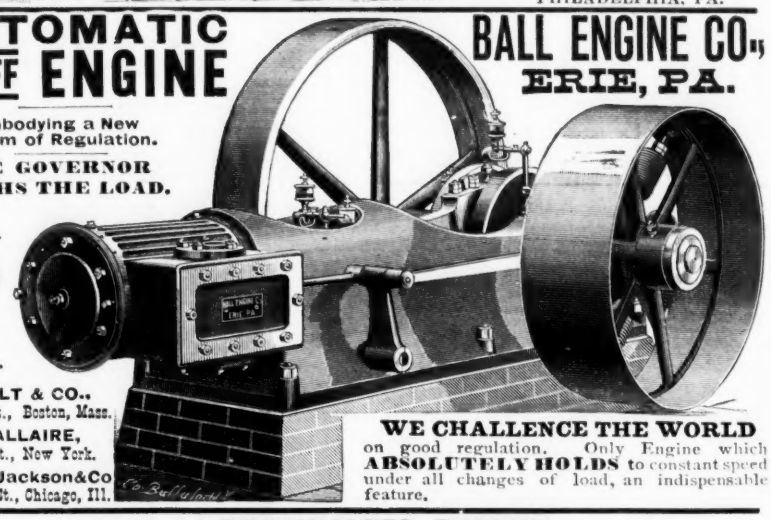

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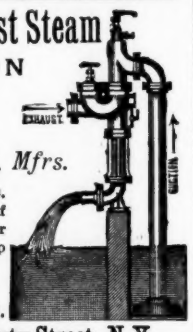

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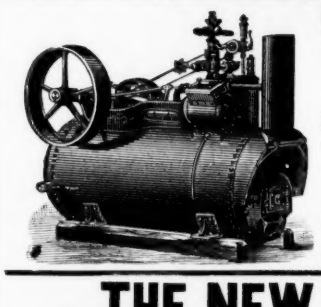

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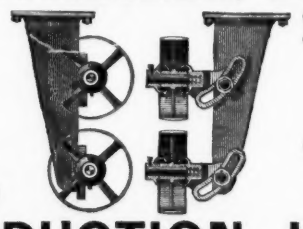

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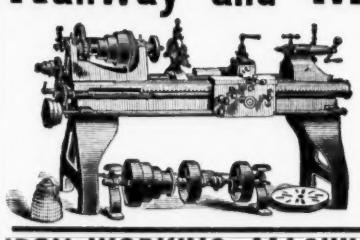

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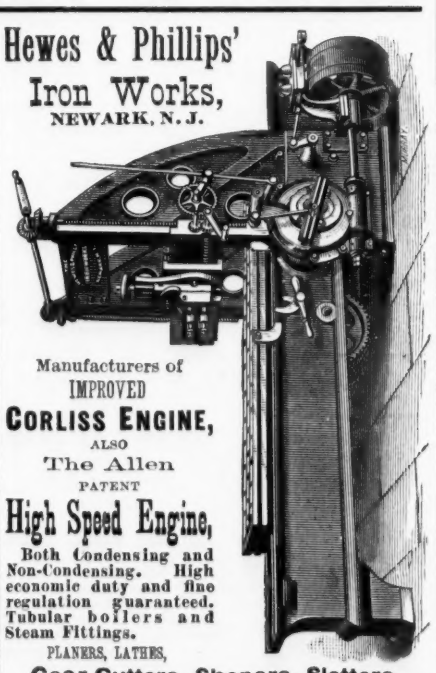

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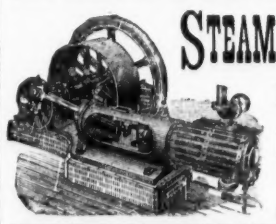

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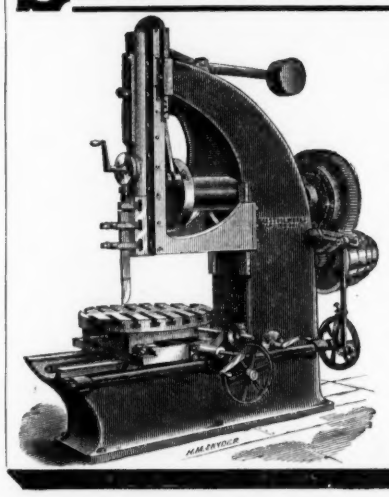

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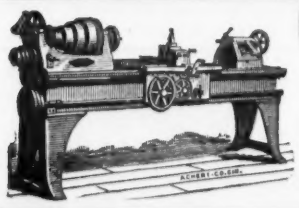

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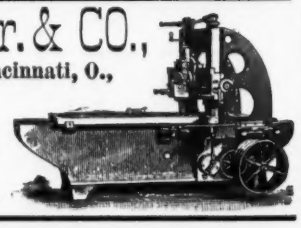

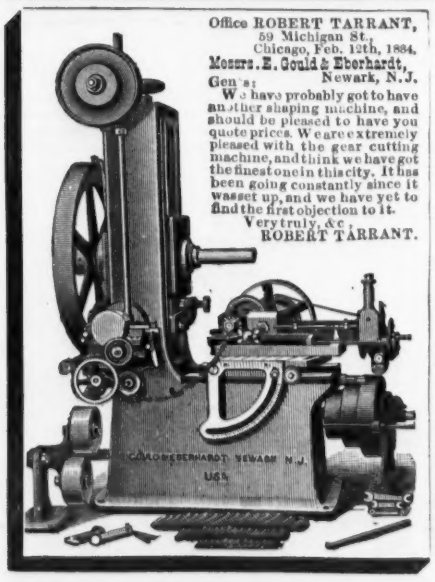

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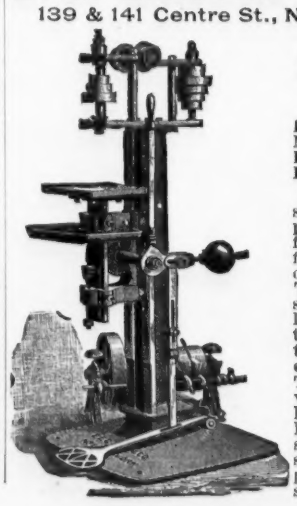

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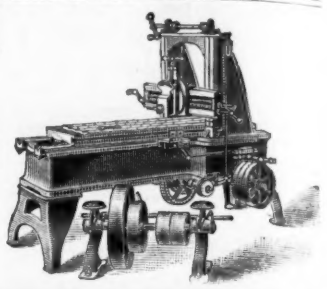

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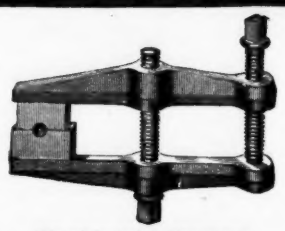

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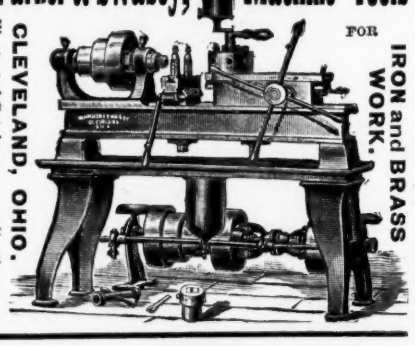

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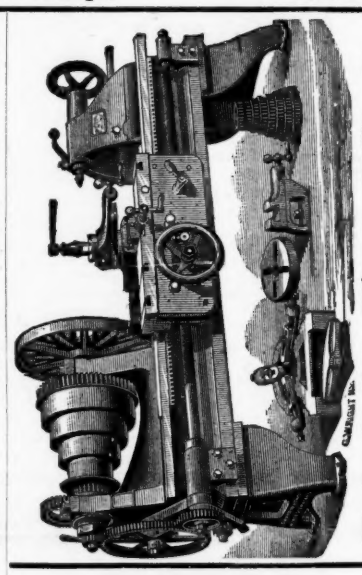

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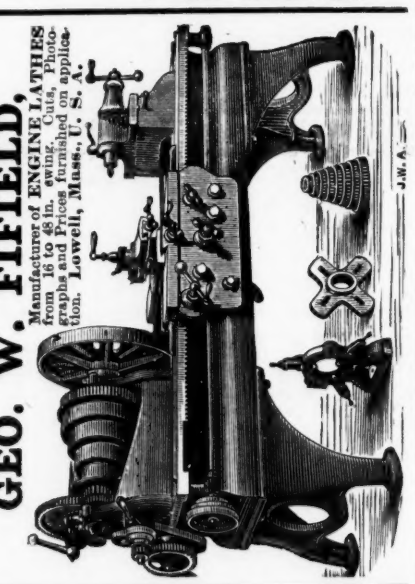

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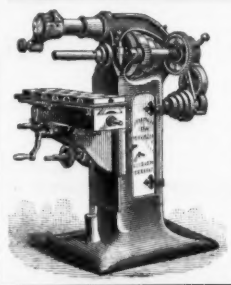

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Brainard Milling Machine Comp'y,

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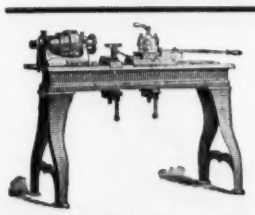
Office, 36 Oliver Street, Boston, Mass.

Write for Catalogue B B.

THE BUFFALO STEEL FOUNDRY, BUFFALO, N. Y.

ORDERS AND CORRESPONDENCE SOLICITED. | PRATT & LETCHWORTH, Proprietors.



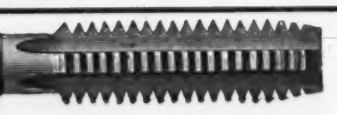
LODGE, BARKER & CO.

CINCINNATI, O.

This lathe is designed for use in all brass-working establishments, is 13 inch swing, 5 foot bed, and has sufficient power to tap one inch holes in brass. Is a good tool for specialties of all kinds, has hollow spindle, and can be handled very rapidly for such work as Lubricators, Compression Cocks, etc.

Weight, boxed ready for Shipping, 600 lbs. - PRICE, $150.00.

J. M. CARPENTER
PAWTUCKET, R. I.



MANUFACTURER OF TAPS & DIES